JOINT STAFF WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)
	)
DEVELOPING A REFERENCE DESIGN	)
FOR DEMAND RESPONSE	)
	)

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

TUESDAY, FEBRUARY 1, 2005

10:02 A.M.

Reported by:
Peter Petty
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COMMISSIONERS PRESENT

Arthur Rosenfeld, California Energy Commission

Jackalyne Pfannenstiel, California Energy Commission

Dian Grueneich, California Public Utilities Commission

THE RESOURCES AGENCY

Joseph Desmond, Deputy Secretary
California Resources Agency
Energy Advisor to Governor Schwarzenegger

STAFFS and ADVISORS PRESENT

Julie Fitch, Advisor to President Peevey,
California Public Utilities Commission

Laurie ten Hope, CEC
PIER Program Area Lead

Mike Messenger, CEC
CEC DR Program Manager

ALSO PRESENT

Ron Hofmann
University of California
PIER DR Program Advisor

Erich W. Gunther
EnerNex Corporation

Rik Drummond
DOE GridWise Architecture Council

Wade Malcolm
Electric Power Research Institute

Ray Bell
OpenAMI Initiative Working Group

Richard Schomberg
Electricite de France International North America

ALSO PRESENT

Terry Mohn
San Diego Gas and Electric Company
Sempra Energy

David Cohen
Infotility

Veronika A. Rabl
Vision and Results

H. Ward Camp
Distribution Control Systems, Inc.

Gayatri Margaret Schilberg
JBS Energy, Inc.
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Oracle Corporation

Boyd Wilson
Celerity Energy

Conrad Eustis
Portland General Electric

ALSO PRESENT

David Wylie
ASW Engineering Management Consultants

John Benson
Comverge, Inc.

Tony Foster
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P.A. "Subra" Subrahmanyam
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Peter Sanza
GE Global Research
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SilverSpring Networks

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Optimal Technologies

Dick Preston
Comverge, Inc.

I N D E X

I N D E X

P R O C E E D I N G S

10:02 a.m.

MS. TEN HOPE: This workshop is going to be recorded. This is a joint workshop with the California Energy Commission, the Public Utilities Commission and the Resources Agency. And we have representatives from each of the organizations on the dais.

I'd like to welcome Commissioner Pfannenstiel and Commissioner Rosenfeld from the California Energy Commission. Commissioner Pfannenstiel presides over the Efficiency Committee. Commissioner Rosenfeld on our Research and Development Committee. And they jointly work together on an ad hoc demand response. So all those perspectives are really representative of what we're trying to accomplish today.

I'd like to welcome Commissioner Grueneich from the Public Utilities Commission, and congratulations on your recent appointment. And finally, to welcome Joe Desmond, the Deputy Secretary of the Resources Agency and Energy Advisor to the Governor.

This has also been a workshop that the research program in PIER has worked together with

the deployment programs in energy efficiency. So Mike Messenger and I have had several conversations about demand response -- I mean about reference design, how it fits into a research agenda and how it may or may not really facilitate advancements in the deployment of demand response infrastructure.

So, what we're really, I think, trying to do today is create a dialogue between those in government and the utilities for providing a vision for what demand response is, and the industry, who could really enable the innovation that would bring new products and lower cost products to the marketplace.

A couple of drivers from the R&D perspective. We've been working on research in the demand response area to bring lower cost meters, thermostats and more insights into the -- capabilities of buildings and sort of advance the technology side demand response.

But a couple of things that became really apparent. One is when you're trying to tell researchers or provide some vision for what functionality you want in new equipment. You need to think about what's, you know, not only what

capabilities you want right now, but what capabilities you might envision in the future.

And one of the other drivers was we're talking you can't do demand response without communication and control. So then you get into issues of inter-operability between equipment between players. And if we really want a seamless system we really need a dialogue on the vision from a function perspective; and also a vision from a technology perspective.

So that's really the dialogue we're hoping to encourage today between all of us. So I really appreciate such a great turnout and look forward to your comments throughout the workshop.

Let me first just put up the agenda. We wanted to start off with some presentations from our policymakers on what's the vision for demand response. What is it that the Commissions and the Resource Agency are really interested in seeing accomplished from a policy perspective in demand response.

And then we'll have a short overview of what is a reference design. Some of you in the industry are quite familiar with what it is. For some of us this is a new language. So, we wanted

to do a short overview of what is a reference design, how is it applied in other industries, what might it accomplish here in the demand response arena.

Our next discussion we did have a panel planned but our two out-of-state visitors from Massachusetts and New York were unable to come. But thankfully Joe Desmond is here and he going to speak to the potential benefits of the reference design. We would have typically put the Deputy Secretary first, but in this case Joe has a lot of content to share with us about the potential benefits of reference design and thought that it would first be helpful to hear what is it. And then a vision of the benefits of what this reference design could do for us.

And we're planning to have an open discussion where we encourage you to ask questions of any of the morning speakers. Then in the afternoon we have an industry panel that will talk about initiatives that are currently underway that could become the backbone of a reference design effort. So that should stimulate, I think, some real discussion about what it is, what industry is doing and what our potential next steps would be

in this arena.

And finally, Mike Messenger will facilitate a conversation between the panelists and members of the audience about is it clear what a reference design is; is there a consensus that one's needed; you know, what might this reference design apply to; and in what timeframe.

One comment on the schedule. If we can go a little faster this morning, we would like to encourage dialogue. Our Commissioners are very interested in hearing from industry, as well as, you know, sharing your visions. So, you know, we may pop into the afternoon session before lunch, depending how many questions there are in the morning session.

Just to set the stage, the goals of this, you know, potential goals of a reference design process are twofold. One is to encourage open architecture so that there'd be common interfaces between products and easy interchange between various vendor products within the overall infrastructure. And the objective would be that this would encourage innovation and would lower cost.

The second goal of developing a

reference design is to create a vision into the future where you think ahead about what's the potential functionality that you might want, not only now, but, you know, five to ten years from now so that if you're making large purchases in infrastructure you have the capability to add functions later without, you know, without having to replace your entire infrastructure.

You'll see this pyramid a couple of times throughout the day. And I think it's kind of a nice visual to outline, you know, what -- how we might map the vision of demand response to a reference design, and ultimately to design specifications.

And I think that for some of us the concept of a reference design has taken, you know, quite a bit of conversation because it's often transparent to general public or government that this idea of -- this concept of a reference design even exists. Industry often creates reference designs on its own, provides products to the marketplace. And, you know, it's pretty transparent to us.

In this case where vision is being established for capabilities of a demand response

infrastructure the premise is that industry would benefit from knowing what the vision is, what functions are envisioned for a demand response infrastructure, and be able to then create the more technical specifications.

So we'll come back to this, and this may be something that will help clarify, you know, what are we talking about and what are we not talking about. We're not trying here, through a reference design, to design what equipment looks like, to constrain the types of products and tools that the marketplace provides. But to provide a common map where we all have a vision of where it is we're going and what functions we're looking to establish.

So, with that, I'd like to turn it over to our Commissioners for open remarks, and -- looks like Commissioner Pfannenstiel would like to start, and encourage your comments.

COMMISSIONER PFANNENSTIEL: Thank you, Laurie. Thank you for some very useful opening remarks. I am absolutely delighted to see this room so full. I think this is an incredibly important subject and clearly a number of other people think so, also.

We can't -- I've often been warned, and in fact warned others, against trying to accomplish too much in any one day. I think that that's an issue here today because we all have a long personal agenda of what we'd like to get through.

But I think we can go a long way, and I think that Laurie used the word a couple times, and I think it's going to be the key today, that's dialogue. I'm coming in here wanting to hear from you about what is possible, what is available, what a reference design would look like. And I understand that you want to hear from us about what is our vision, what is our direction, what do we need in a reference design.

The one term I think, the one word I don't think people have used so far yet today is meter. And maybe it's because we're not really talking about meter in the conventional sense, but we're looking at something that may be the next generation of what a meter used to be.

Let me just start by observing, and I think people who have worked with me awhile know that this is a common whine that they hear from me, that I have been looking at what is now called

demand response for 30 years. That 30 years ago I worked on a program in Connecticut that was a peak load pricing experiment, as the terminology was then. Looking specifically at would customers respond to price signals. And if so, how much. And surprise, surprise, we discovered that they would respond, and they did respond in ways and at a level that was more than I believe people expected.

But the intervening 30 years have not seen a great movement towards putting those kinds of rates, time-varying rates, into active use. And, of course, the real reason was the meter. The cost of that meter.

The meters that we used in the Connecticut peak load pricing experiment were $842, as I remember. Clearly they're sophisticated meters, clearly not meters that would be put in on a wide scale.

So the 30-year period has been spent largely trying to figure out that part of the equation.

Looking at California presently there are about 11 million electric customers of the investor-owned utilities. And of those 11

million, some couple hundred thousand have meters with a functionality able to do some kind of time varying pricing now. So, we don't have -- we have not come very far in California as far as that goes.

Whereas two years ago the energy agencies in California adopted an Energy Action Plan looking at how we're going to meet our future electric needs. And as part of that we talked about using energy efficiency and demand response as an important part of meeting our electric needs. So, from a policy basis, we're there; we're ahead of where we practically can be.

So the challenge now is to cost justify this investment in replacing the old meters with some new device, some new communication measuring device. And I believe that most people in this room can talk about the cost of that device, but what we really need to think about is the benefit. Where can we get the benefit so that it is a reasonably effective and an economic decision to change out 11 million meters and put in this new device. That's what we need to -- that's what the dialogue today, I believe, needs to start getting towards.

Now, clearly 11 million meters is too big an investment to get wrong, to take lightly. In fact, it's such a big investment that for 30 years we have been waiting for the perfect solution before we made any movement on that.

When you think about it, we'd be changing out those 30-year-old meters right now and starting into next generation already.

But while it's too big an investment to get wrong, it's also too important an investment not to do. So, we're here today seeking input from you and hopefully providing whatever direction we can offer you to be able to get going on this.

So, with that, thank you all for coming. And I will turn it over to Commissioner Rosenfeld.

COMMISSIONER ROSENFELD: Thank you. First, chairkeeping instead of housekeeping. There are four chairs here at the front desk because there's people seem to be crowded at the back. Julie Fitch, President Peevey's Advisor, has just arrived after coping with traffic from San Francisco. Julie, come on up here and represent your part of the PUC. She's being modest. Come on, Julie. Thanks, oh, good,

Laurie's got the right thought next.

So, I'm supposed to take a few minutes just to put this in some sort of context. I'm, of course, at a disadvantage because I don't have a laser pointer, but I'll try to cope with that. I think Ron's going to fix it.

Demand response, what's the potential. This is the famous slide; this happens to be the year 2000, 52 weeks, which I think we more or less have all seen and know by heart.

You see it starts off in January -- bless you, let's see if it works -- look at that. I always knew Ron Hofmann would come in useful for something.

(Laughter.)

COMMISSIONER ROSENFELD: So 52 weeks of weekends and weekdays, and then the weather gets hot and air conditioning turns on, and then fall sets in again. And the stakes here are that this 14 percent of peak is commercial air conditioning; and this other 14 percent of peak is residential air conditioning.

So we have a huge resource of -- it's the way thermal mass during these times if you set up the thermostat four degrees it takes buildings

hours to -- four hours to even notice it. And so that's great for both emergency response and economic demand response, which I will call demand response from now on.

Next one, please, Laurie. Demand response policy. Sort of context where we are. We're not going to go back 30 years, but we're going to go back a couple of years. This proceeding started in June of '02. The assigned CPUC Commissioners, President Peevey, I'm the CEC representative, and Sunne McPeak started off representing California Power Authority, now defunct, but is still taking a serious interest in this. And so we have three agencies and Joe Desmond representing Resources and the Governor's Office.

What's really not under discussion today, but something already under our belt, is that the proceeding has divided itself into working group two, which is the, I think, about 5000 customers over 200 kilowatt, who got interval meters in a hurry and got onto time-of-use pricing in a hurry. That was a big advantage. And now are being offered critical peak pricing.

Working group three, which is really the

challenge here, is the remaining 10.9 million customers who don't have interval meters and should have. All we have there is a statewide pilot project, which I'll talk about in a minute.

Utilities have submitted business plans for AMI, advanced meter infrastructure. Not at all in agreement at all, PG&E seems to be quite enthusiastic. At the other extreme, Southern California Edison is quite unconvinced. And in between Sempra seems to want to divide its territory into cool, coastal, which doesn't need meters -- which doesn't need demand response as badly, less air conditioning; and the other half is hot where they'd like to make some process.

So, we have a lot of meters. We have clouds ready to rain and time for us to do something. And many other states and countries are very interested. We even have Richard Schomberg from EDF here to egg us on this afternoon.

Goals are vague, but once we get started, if we do AMI we should be able to do 1 percent a year in the sense of essentially reserve margin.

Next slide, please, Laurie. Just to get

the terms straight. Three sorts of pricing. Time-of-use pricing, as I say, is now required of all buildings greater than -- all customers greater than 200 kilowatts, and it's optional in some utility territories.

At the other extreme is real-time pricing, which is what we all thought about a long time ago. It's difficult for two reasons. For homeowners the idea of coping with 24 different prices every day seems to be complicated. Most utilities are trying, instead, the intermediate critical peak pricing, which is sort of based on the concept that you let customers know, hopefully 24 hours ahead of time, and that they will happily put up with curtailing their comfort 1 percent of the time when they wouldn't consider or want to do it all summer. But the whole idea of critical peak pricing then is like 1 percent of the time on hot afternoons.

Next one, please, Laurie. Vision, this has started out being adopted in this proceeding and has spread to the Energy Action Plan. The key word is customer choice. Our vision is that all customers should be offered something appropriate, mainly critical peak pricing. But if a customer

says I don't want all that uncertainty, I'm willing to pay to have a little bit more to have the utility take the risk, and I'll go back on to just time-of-use pricing, which is predictable, or even flat pricing if they want to pay some more on a baseload, we'll do that. And for (inaudible) customers perhaps even up to -- to real-time pricing. But we don't have real-time pricing in California now, except on a very (inaudible) market, so that's not practical right now.

Next one, please, Laurie. An example of the critical peak prices which are being offered. This is one which actually is in place now for large commercial customers. The ratio is huge. The solid blue line, which you see here, is standard time-of-use 99 percent of the days of the year, shoulder and peak, and a little shoulder and off.

The critical peak is -- I'm sorry, it was supposed to be this line, the higher of the two. The critical peak 1 percent of the time has a shoulder and a three-hour critical peak. You're paying more during this time so you get a reduction below time-of-use 99 percent of the time. And the pricing objective is that if you

don't respond you come out revenue neutral, and if you do respond you save money.

This picture has been simplified for the critical -- for the statewide pricing pilot for residential and small commercial. And Laurie is going to show that on the next slide.

The coloring is a little bad here. The flat line is what the control group is, what most of us have today. The time-of-use was one option offered. And critical peak pricing, very hard to see, that's supposed to be yellow and light gray. As you can see there were (inaudible) 50 cents or 70 cents a kilowatt hour. A huge increase. And we got nice responses from that, which was encouraging. Which was one of the reasons we're all here.

There's a problem, I don't want to oversell this. This is demand response programs in place in megawatts as of about six or seven months ago. This isn't quite up to date. Some 1700 megawatts all together.

What I want to point out in honesty is the critical peak pricing is only 26 megawatts. Basically this was a voluntary measure; it was competing with interruptibles and curtailables

which are much more attractive. Nobody signed up. We've all now become convinced that if we're going to have critical peak pricing it's going to have to be the (inaudible), and if people don't like it, they can opt out for something more predictable. But when you offer prices 1 percent of the time, it doesn't make much impact on your total bill. And so you're not going to be very interested. Although the utility and the state may be very interested for reliability purposes.

Next one, Laurie. This is the response on small commercial customers to an experiment about a year ago in which the critical peak price was turned on at, I think, 2:00 p.m. You can see that small commercial buildings have a lot of internal loading, heat up fairly fast. So setting up the thermostat four degrees was only good for a couple of hours. On the other hand, when we get to homes in a minute, you'll see it last a lot longer.

The statewide pricing pilot for residential and small commercial had to take into account that the state has a huge variations in climates, so the utilities who were running the experiment divided the state into four climate

zones.

Coastal is blue, very little air conditioning, that's climate zone one. Intermediate, here's the Central Valley where most of the air conditioning load is. And I'll show you a slide from that. And then, hot, which I won't even mention.

There's the response for, I think, climate zone -- better read my own caption -- 12 cpp days climate zone 3. Yes, I did it correctly. And you can see that even though this is diluted by the houses that didn't have air conditioning, and although there were no demand responsive thermostats, only the tariff, you get like a 20 percent effect. So, that's really encouraging and the statistics are pretty good.

Next one, Laurie. This is the statewide response; two different methods of analysis. This is statewide. And if I can read here, the results were either 13 or 15 percent for the whole state, even allowing for the non air conditioned houses. And the fact that the weather wasn't even very hot. So we certainly seem to have (inaudible) demand response pretty well pinned down.

This is the most interesting plot, and

unfortunately, the most interesting line is again the yellow and light gray. This is an experiment called CPPV or variable, where the customers were given meters and could preprogram them.

Here's the control. The second line is customers who responded and over-shot a little bit later in the evening by setting up their thermostats. Without --

MR. MESSENGER: No price signal.

COMMISSIONER ROSENFELD: Say it again?

MR. MESSENGER: There's no price signal in that. What they got was they get an incentive if they don't override when the utility sends a signal asking them to set their thermostat up.

COMMISSIONER ROSENFELD: Yeah, so this is pretty remarkable. I'm repeating Mike's statement, thanks, Mike. Got it confused for a minute.

People will program their thermostats when they know there's going to be a shortage of power in the afternoon, or price is going to be high in the afternoon, even if they're not charged that price. So this is a sort of patriotic aspect of -- state-triotic, maybe, of demand response.

The yellow line is, to me, the most

interesting one. This is the people who got both the price signal and the thermostat which they could preprogram. And, as you see, the results are really huge. So that's the direction we want to go.

I must be getting close to the end. What's the next one, Laurie? Oh, definition of terms. A big issue here. What are we, in this room, going to try to talk about in the way of how broad a net are we going to cast. Are we talking only about a meter, or are we talking about the whole system. I guess that's going to make a lot of comments this afternoon.

So, this is a house. And this is the very minimum sort of communications and references we're going to need. Here's a meter. And, in principle, all the meter has to do is to send information back to the utilities on demand, maybe every ten minutes.

On the other hand, that doesn't do any controls, and you don't want people to be home all the time, you want them to make up their mind once every year or so.

So here's something which I've called a thermostat. Now people may not want to call it a

thermostat, they may want to call it the user interface, they may want to call it a control system.

It has to be a lot more sophisticated, but I'm hoping that we will address even a reference design for the whole system.

One other remark is I call this an interval meter, but, of course, that can be a whole system. When Itron thinks about an interval meter they think about a pretty primitive meter, itself, but a pretty sophisticated controller up on pole-top, somewhere close.

And so when I say meter, that's a shorthand. And when I say thermostat that's also a shorthand.

Next steps. What are the issues here. I guess the main one that, from up here, we're going to come on strong about, Jackie Pfannenstiel already mentioned it, is we're putting a lot of hardware out there, better be pretty perspicacious and have it be able to download all sorts of applications that we haven't thought of yet because this is a very dynamic field.

I guess I'd like to look at the very last bullet which says my particular prejudices at

issue, which I think are those of the CEC. I just said how broad a design. Are we ambitious enough to try to do the whole system.

I want to add a couple of just little things that have been in my mind for a long time. This system is going to want to respond to pricing, but it's also going to -- the same hardware can respond to emergencies. If it's going to respond to emergencies, how smart do we want it to be. Do we want it to have under-voltage and under-frequency capabilities so that the air conditioner can be what kicks out first instead of a transmission line or a power plant. So how fast a response do we need.

Some obvious things. We may want to measure and track reactive power. A point which I think Joe Desmond is going to spend a lot of time on is customers access to his or her own data. That seems to be very important for two sorts of reasons, economics, which I'm going to leave to Joe; and also I visualize also some marvelous systems in which both utility and private vendors will compete to give you great in-home displays of what you're using at the present moment and how much money you could save if you turned off a

particular appliance.

And some sort of disaggregation, which you can get with data, so that whenever you want to call it up you can get a time series plot of what you used on a typical hot day, and how it was apportioned to your air conditioner and your water heater and your pool pump and your whatever.

And finally, of course, we need net metering because we're all interested in promoting PV and solar. I'm in particular interested in promoting them on a performance-based system in which they'd be compatible with how many kilowatt hours did they actually generate and not having any kilowatts installed on your roof.

I hope that's the last one. Thank you very much.

COMMISSIONER GRUENEICH: Thank you, and let me start off by thanking the Commissioners and the staff for inviting me here. To me this is one of the signs of the close working relationships between the Public Utilities Commission and the Energy Commission that everybody is trying to work together to take advantage of where there are opportunities and really meet the challenges.

And I also want to thank Joe from the

Resources Agency and the Governor's Office, for also participating. I'm very happy to be a guest here. I'm going to keep my remarks very short because it was exactly two weeks ago today that I was appointed and sworn in as a Commissioner at the Public Utilities Commission. So I think it would be frankly presumptuous of me to be here trying to give you a very in-depth overview of what the CPUC is thinking and going -- and I apologize for that, but I want to be quite frank about my newness.

We do have Julie here who is absolutely immersed in the PUC intricacies in this area. And certainly, Julie, if you want to speak at all on this, let's hear from you.

What I do want to say is for me this is actually a very nice moment that some of you may know, but I started off my energy career 27 years ago, I think with Mike and a number of others, where I started off as an employee at the California Energy Commission. And I worked with the Commission here in Sacramento for five years. And then left and went to the Bay Area.

But to me this is actually a very sweet homecoming to be able to be with the Public

Utilities Commission at a time when I've never seen greater cooperation between the two agencies. And so I'm happy to bring together some of the background and certainly some of the close professional relationships that I kept over that quarter of a century in working on energy issues.

I'm also extremely pleased to be here with Art. I think he and I first started out about 20 years ago where I was assisting him on his efforts to really get more state funding for R&D. And as everyone knows, Art has been a valiant supporter of that effort.

And certainly as I move forward in my new position at the PUC, one of the areas that I am very much in support of is having adequate funding for R&D efforts. And with that, looking also at emerging technologies.

And I bring this up because to me one of the things that I certainly hope we can take advantage of in this area, so to the extent it's a vision I can share at this point in time, is really the abundance of creativity and the ability to develop new technologies and new communication systems.

And as Commissioner Pfannenstiel was

saying, certainly my experience we've been sort of hooked on the meter for 30 years. And I'm very excited about this active planning, proactive planning, to think ahead and not just be reactive, but to say what are the technologies out there. What could we consciously think about incorporating in our system so we can take advantage of that.

And I just wanted to share with you, given my background, that something, and in particular I'm very interested in focusing on and understanding what are the new technologies and capabilities out there, so that as we plan our systems for the future, we're really taking advantage as much as we can.

The other element I wanted to just comment briefly on is that this, again, is a perspective that I bring with me, and that is the customer side. That I noticed on the pyramid that we had, I think, vendors and utilities and business and the PUC and the CEC and the Governor. But I'm not sure I saw the customer.

And one of the items that I've certainly learned over the years is that there can be great theory in all of this, but when it comes down to

it, a lot of the actual success of measures depends upon the customer perspective.

So that I certainly hope, as we develop, that there will be opportunities to listen to customers and to hear directly what does work, what their visions are as far as their goals, and how they see incorporating these new technologies and these new ways of thinking.

And with that, I just wanted to again thank you all for being here, and thank you for the warm welcome. And I'm very interested in listening and learning as much as I can today.

MS. TEN HOPE: Thank you for coming so early in your term. We appreciate you being here.

Julie, would you like to make any comments?

MS. FITCH: Actually came here today mostly to sit in the back of the room and learn. I didn't know you were going to make me come up here and sit at the front. So I have no prepared remarks.

I just wanted to say that as I'm listening to the other folks make their opening remarks I'm struck by the huge vast task we have in front of us. What we're looking at is really,

it sounds like modernizing the entire utility infrastructure.

And, you know, we're talking about tariffs and meters and technology and customer information, and all of these things are major issues. And so I just think our challenge is to figure out how to take a step-by-step approach to this and really make progress. And we've been trying to do that together with the CEC for two years now. And I hope it continues.

So, thanks.

MS. TEN HOPE: Joe, we'll have your presentation shortly, but if you wanted an opportunity --

MR. DESMOND: I'm going to hold off.

MS. TEN HOPE: Okay. I wanted to make one other introduction. PIER has new program manager, Dr. Krebs. So after a long national search, we now have a Director, and are pleased to have Martha here.

All right. I'm going to turn the podium over to Ron Hofmann. Ron is an advisor, demand response advisor to the PIER program and the initiator of this idea of the need for reference design for demand response.

COMMISSIONER ROSENFELD: Laurie and Ron, advertise that there are still a couple of seats here, because I keep people seeing frustrated --

MS. TEN HOPE: There are seats here, and feel free to come up to the front. You're welcome to sit anywhere.

MR. HOFMANN: Good morning. The title of my short little talk is what is a reference design. But the truth is I'm really here to introduce Erich Gunther, who I'll introduce in a few minutes. And he will provide you with a definitive description of what we mean by a reference design in the context of this proceeding.

I'd like to take just a couple of minutes to really just summarize a few of the key notions that actually have been discussed by some of the Commissioners this morning before we actually get into the description of what a reference design is.

Commissioner Rosenfeld has already pointed out that there's a current order to institute rulemaking on the way. It's been going on for a little over two years. And in the OIR for demand response probably the one thing that

makes it unique in many OIRs that have preceded it, is that we're dealing with dynamic tariffs versus static tariffs that have been dealt with in the past. And the outgrowth of that is the implications for the advanced metering infrastructure.

And we will see today that this issue of dynamic tariffs and advanced metering infrastructure is, in fact, one of the main cornerstones of why a reference design may be needed.

In general, I think most of you know the process of how our industry works. The key thing that I want to focus on at the moment is that the California Public Utilities Commission presents a legal document which are the regulations under which the IOUs operate.

And in this particular context, in particular in the AMI context, I see reference designs as playing a clarifying role between the regulatory legal document and the functional steps for each of the -- that would come from each of the IOUs.

So, in what we're talking about today one way to think about the reference design topic

is that we will have a process called a reference design, or a document called a reference design, which will have an unambiguous mapping between the legal decision, which are the regulations, and those functional specifications which the IOUs will come out with that will lead to the system that gets deployed.

I was at a meeting in San Diego last week and I didn't realize until that meeting that this statement had to be made. The reference design process that we're looking at right now is not in any way intended to slow down the process that's underway with the OIR.

So, it is a parallel process. It will be an ongoing process so some portion of it needs to get done very quickly to be consistent with the legal process that's underway. Again, no intention to slow the process down. But there will be an ongoing process which you'll hear more about later today.

And I think this is an obvious statement, but whatever the reference design is, however it's function is perceived, it must accurately reflect the new regulations. So one litmus test might be that once a reference design

exists, the regulators can look at the reference design and they can, in fact, see embodied in the reference design those regulations, those visions, those policies that they were hoping to see that they had written into the regulations.

So, let me just give you a couple of quick slides on reference design before I introduce Erich, who will, in fact, do a much better job than I'm going to do. But trying to layer his presentation to get you sort of thinking about the things that we think are important.

So, one of the statements I make when I try to explain what a reference design is, I try to tell you that they hide in plain sight. Reference designs existed in industry for a very long time. In my whole technical career I have dealt with reference designs continuously of one form or another.

And markets are basically built on reference designs. And the most obvious examples to us all in this room is the PC industry exists on a published reference design that IBM made in the early '80s. And that reference design pretty much still exists, as published, today, even though technology has changed dramatically, even

though the applications for the PC platform has changed dramatically, the concept of the reference designs which developed the market, consequently developed the industry still exist today.

And I have since gone back and tried to remind myself of what that reference design looked like; and, in fact, it's amazing how much foresight was in that reference design.

Another sort of obvious statement about reference designs is that it creates a level playing field and allows companies to compete for business, creates standards involved, new applications. Everybody knows what the game is with a reference design.

And as we're sitting here today people are creating reference designs that we'll never know about, but they'll be in products that we will probably use.

So, I want to create a hierarchy in your mind which can be challenged later today. This is just something to start the conversation. It's the pyramid that Laurie showed. And I will show that pyramid again in a moment. But the hierarchy is basically reference designs define a generic vision. And they lead to functional

specifications.

The generic vision is not to be constraining, because the purpose of the reference design is to create something for which you don't know all the answers to down the line, creating a market that might exist for which, like the PC industry, just develops.

So reference designs, in the context we're talking about here, might be something that is created by industry as a whole. It would then allow each of the three IOUs in the state, and others, to create functional specifications that are unique to their systems, but, in fact, encompass the reference design issues that are a mapping of the regulations.

And these functional specifications then are bid upon by the vendors. And what they have are design specifications which we hope industry, meaning all of you, will decide should be based on known standards.

We very much hope that this process does not get misinterpreted to be a standard process. This is not a standard process. There are lots of standards out there. But this is a -- the reference design process is to identify a starting

point for something that everybody knows leads to the same goal, the same vision and policies.

So, I wrote up on the train up here this morning, because of some comments that were made to me in San Diego, I wrote up what I think is the purpose of the reference design. I'd like to read it to you. And I hope those of you that have contributed to it in discussions when I was in San Diego, I hope I have not misrepresented what you told me.

The purpose of the reference design is not to pick a solution, but to promote low-cost, inter-operability and define a system that can adapt to inevitable changes in regulatory policy. For example, different dynamic tariffs.

No matter how diligent policymakers are they won't get it right on day one. There's nobody in this room that gets things right on day one. So you can't point at the policymakers and expect them to be perfect. And we have the experience of 1996 leading to 2000, 2001; there's blame that goes around to everybody. So, no, you can't point to any one person. Everybody went into that trying to do the right thing.

The policymakers will want to and need

to make adjustments. Excuse me, want to make adjustments in tariffs and programs. Since we're talking about dynamic tariffs, we need to build into the reference design requirements that allow evolutionary changes. The reference design shouldn't care whether the design implemented has all the intelligence at the end device or in the network or somewhere in between.

It needs to define the flexibility required to deal with evolutionary changes and inter-operability. So I hope that reflects comments that I got last week in San Diego.

I'm ending with this picture again to remind you, I don't have my pointer because Art has it, but if you look at the line between policy and reference design -- no, Art, it's okay, it's okay --

(Laughter.)

COMMISSIONER ROSENFELD: You might need it.

MR. HOFMANN: If you look at the line between policy and reference design, this is the key issue. The key issue is how do we do that mapping. And we're hoping that the reference design will do that.

So, at this point I would like to introduce the speaker that will actually get down to the details. Erich Gunther is a contractor to the PIER program. He has helped develop a strawman reference design which you will hear about at 1:00 this afternoon. It's the idea to get your juices flowing. Doesn't have to be the reference design for information exchange in the PIER environment, but it's something to get you started thinking about it.

He's the Chairman and CTO of EnerNex Corporation. He has 20 years experience in the electric power industry. I've known him for a number of years. He's a very competent person.

He's currently a member of the Gridwise Architectural Council and he was also a subcontractor to General Electric in the development of IntelliGrid.

So, with that, I would like to introduce Erich.

MR. GUNTHER: Thank you, Ron, appreciate that. Good morning, everyone. Hopefully we can, through the next 20 minutes or so, can try and get everyone up to speed on what a reference design is from a variety of points of view. So that's my

task here, to see if we can accomplish that.

It's proven to be a difficult task throughout this process because those who have dealt with reference designs over a number of years have usually worked with a reference design concept in a variety of different aspects of a product development cycle of one type or another.

And a reference design really has several facets. And the one that a lot of people, you know, quickly gravitate to, or are familiar with, is the hardware aspect of a reference design. So those who have developed hardware here are very familiar with a reference design.

But on the hardware side, we're talking about a meter, or I'm going to use some other examples here today, a cellphone, a GPS device, a thermostat or an automatic teller machine.

But in addition to the hardware aspect of a reference design there are systemwide aspects as well. There is reference designs associated with the software that makes all pieces of the system work. There's reference design aspects of the networks, the communications that are used to connect everything together.

And then there's reference design

aspects to the information that's being transformed and the transaction model that's necessary to move that information from point A to point B.

So there's several different facets here, and one of the things we have to figure out as we move along with this whole process is, you know, what aspects of the reference design concept are we going to address early on. What do we want to do over a period of time.

Notice in this particular slide here, you know, the ATM, automatic teller machine, shows up in several places. And I just want to dwell on that for just a moment to point out how there are many different parts of the system that constitute a reference design.

We've got the very familiar automatic teller machine. You see an ATM, you know it's an ATM when you're walking down the street. Ten different vendors, five different vendors, you know, may produce them, but it looks like an automatic teller machine. You almost intuitively know how to use it with a little bit of prompting from the menu system.

In order to make that work there has to

be a common set of software in it. Inside that automatic teller machine software to produce the menus and the like. So there's a reference design associated with it in its user interface.

There's a reference design for the network used to carry, you know, that traffic. And there's a reference design associated with the transaction model which addresses security and the like. And a similar thing is true for transactions, for all electronic data interchange in general and point-of-sale type devices.

So, keep in mind that there are several facets of it and everyone here probably identifies with different pieces of it. And we'll try and make that a little bit clearer, is what we're going to try to do as we go along here.

So, examples of very successful reference designs include things like the cellphone. Ron mentioned earlier the personal computer. Point-of-sale terminals, you know, almost every supermarket anywhere you go now has got one of those little boxes right there where you swipe your card; you all know how to use it. That's a reference design -- there's a reference design responsible for that ubiquity.

The teller machines I mentioned, and another one we're familiar with, I've been using those all morning to get all the presentations on here, you know, the USB thumb-drive. You know, all look about the same. You know here to plug it in. You know how to use it, but you don't really pay attention to what is underneath that in order to make -- get all to work so that any vendor can produce the same product and have it just work.

The cellphone example, just to drive this home a little bit further, it looks like a cellphone, you know, you intuitively know what it is when you look at it. This reference design has been around since the beginning of the cellphone. This is an example of a situation where, you know, the cellphone concept, when it was started, this reference design, the basic display, the buttons it was going to have, the basic input/output ports were pretty well defined early on.

And much like the personal computer this one has survived, you know, to this day. I saw someone earlier today who has, you know, a cellphone that has a video movie player in it, you know, a gigabyte of memory, but by gosh, you can still make a phone call on it.

So, you know, the actual detailed designs can evolve, but the core functionality, the minimum functionality, you know, ten digits, a couple other buttons to make a call, you know, is still there.

And so multiple vendors make these devices. They interoperate with other networks. You can even import your phone number from one vendor to another. A lot of things have to happen behind the scenes in order to make all this work, and all of it is related to having a common reference design that everyone can work towards.

The best thing about this is when you have this kind of an approach there's a clear business model among all the interoperating pieces of the system. So there's lots of places for lots of people to play, turn out good products at low cost, and make money.

Another example. Cable modems. Early in the industry, and we'll see a picture here in a moment, you know, there was no standard for providing digital communications, computer communications over a cable system. I suspect many of you here today, you know, have cable modems for your conductivity at home.

So another example of system level reference design, as we start getting into something that you may be more or less familiar with, but you know, a high level description of basic components that are on the network side in the home, the cable network. You know, we start getting into concepts here that describe building blocks and how they sort of connect together. We're not specifying the chip set here that's going to be used; we're not specifying low level details, but we're saying that we have a cable network, we have a whole network, we have, you know, host computers, and the gateway aspect of things here. A network following certain standards. So this is an example of a piece of what constitutes a reference design.

We can go back down to the device level, though, so we have that system level, a reference design document, typically, and we'll see an example of an outline here in a little bit, you know, many facets, lots of diagrams, lots of descriptions of how complements interact. So don't worry about getting hung up on the details and the things you can't read in here. Suffice it to say that a reference design goes down suitably

enough to the level of detail that a designer can make a reference design and implement it in a variety of innovative ways over a period of time.

So if we do a good job in a reference design, that reference design will hold for some time, a number of years, and allow a lot of innovation to occur through its lifetime.

In this case for the cable modem evolution, one of the reasons we want to have one is without a reference design you can turn out really good innovative products and, you know, the issue can be that it may be difficult to get any kind of consistency or operability, but, you know, you have a number of players, you know, that may come into play as this happens, you know, early on here. But what you can run into very quickly is end up with vendor lock-in with proprietary systems.

You can get a number of players who will produce a system and install that in the city or whatever the case, the cable industry, and you're pretty much out of luck if another vendor comes up with a really cool feature you'd like to have, you're talking about a wholesale, you know, replacement of a system in order to be able to

take advantage of that feature without inter-operability.

And that was the state of the industry in the cable modem industry, you know, for these first four years here.

Then a process began recognizing that standards were needed. Which then evolved finally into the standard that is now deployed. The most interesting thing to note, this is a very classic case history here of showing how what a reference design can do to improve competition and reduce costs.

Back actually in the late '80s I deployed a cable modem based system in Glasgow, Kentucky. And, you know, the modems we were using there were even more expensive than this.

But, you know, here, a few hundred dollars, you know, for the hardware at the beginning of this, when we have proprietary solutions. As the, you know, the -- standards, you know, initiative started and we started to get people building with the draft and finally have the full standard, prices, you know, dramatically lowered.

And today you go to CompUSA or whatever

your favorite electronics store is, and you can buy cable modem off the shelf, plug it in at home and it will work. And now for, you know, basically, you know, 30, 40 bucks. So that's a really good example of what can happen with a really good reference design.

I've probably said many of these points here, but the lessons learned by the multiple system operators is that with these proprietary hardware and software solutions, you know, it always does result in vendor lock-in and that's something that is true in almost any industry. If you have proprietary solutions, you get stuck and have the vendor lock-in, you know, problem.

So now with the standard, you know, the digital cable side for data, we've gotten around that problem. On the analog side, we still have a couple of vendors with a duopoly, you know, with set top boxes that, you know, you may have run into that, you know, today.

However, new standards activity in this area is looking to go ahead and try and mitigate that problem with the open cable work, you know, through hopefully -- 2007.

Once you have these standards you also,

you know, need, you know, a way to, you know, deal with compliance and certification. In the cable industry there's a thing called Cable Labs. So there's a whole lot of things in other industries that pop up, you know, out of creating reference designs and standards.

Just another quick example of the thumb drive. This is an example of, you know, much more hardware oriented one. Basically if you look at a reference design for a thumb drive, you'll see block diagrams that define, you know, the high level application environments, some details on the way it interacts with the systems, some basic requirements.

A reference design contains a lot of information at varying levels of complexity in order to complete the reference design.

Here's an example of how Intel described, in a press release, you know, their reference design -- a reference design of theirs, and what it's designed to do. I don't know if this shows up well here, but in red, you know, this reference design is intended from a hardware and software developers, accelerate the development and production of powerful, scalable,

interactive consumer products that integrate the capabilities of a number of previously discrete devices.

That is true for almost any reference design and certainly would be true, to a large extent, in what we're looking to do here in our industry.

Give you an idea of what a document looks like. I've been asked several times, what does it look like. You know, is it a single sheet of paper; is it four pages; is it, you know, a volume of documents, you know, this high. You know, what is it.

Well, the answer is yes. It can cover a wide range. I work with reference designs that are only three pages, four pages, you know, for simple devices. The reference design for the thumb drive, the high level one, is relatively short. Other reference designs like the one I briefly show here an outline for is about 80-some pages of documentation.

So this particular one, it's a document; has an overview. This particular one identifies market issues, success factors, cost issues, who the users are, a variety of configurations on how

the reference design elements can be configured, and what the basic, you know, building blocks are.

If I drill down into an example of it, the configuration overview part of this particular one, goes into equipment resources that are needed, how they compete to figured, stand alone or interconnected, and a lot of diagrams, you know, suitable for high-level architectural-type designers, businesspeople to understand how the thing fits, all the way down to very detailed examples of how something may be implemented. Describing the hardware components, the software components, and any third party device things that it may interact with.

That's probably more like what we'll eventually want to do. But, you know, that's one of the things we have to learn here, is, you know, what's the low-hanging fruit; what do we have to get done; what do we need to do to implement policy; how, you know, the range of reference design approaches, you know, what do we need to do, should we do in our environment.

Just a couple of examples of geek slides; those, I'll pass by those.

Okay. Just want to review for a moment

the purpose of why Intel put this reference design together. You know, there's always a reason, and we need to keep that mind, is why do we want to have a reference design.

But Intel's purpose for this one is to reduce the barrier of entry to implementing specific solutions by publishing a reference design.

Manufacturers respond by building systems that use more of Intel's chips. Intel will tell you that their only optimization function for anything they get into is to sell acres of silicon. That's how they put it. So, you know, it's a very straightforward thing to do.

Now, you know, we can -- this afternoon we may get into this more, but there's a very similar kind of rationale for what we want to be able to do, you know, here. We want to be able to have, you know, our policymakers establish the vision and the policy, you know, for what's out there. We want to find a way to enable people to easily, cost effectively, you know, do it.

And in the end, you know, we want to be able to have a more efficient, safer operating, reliable power system. So, very much a number of

parallels here.

And I don't know what the protocol is, if we're doing questions now or not, but -- so we're going to wait for -- okay, yes. So we'll have plenty of time for that.

So, anyway, that's it for this part of it. Hopefully it's a little bit clearer, but if not, we'll be able to discuss further today.

MS. TEN HOPE: If you wouldn't mind, to ask questions after our next presentation, we'll have an opportunity. Our next speaker is Deputy Secretary Desmond, who will be speaking to the potential benefits of developing a reference design.

MR. DESMOND: Thank you, Laurie. Erich, I just want to make sure, you're not suggesting there's anyone here that wants to sell more meters, I hope.

(Laughter.)

MR. DESMOND: That's just one of the outcomes of the process.

First, let me touch on some of the government's priorities relative to this issue of dynamic pricing and advanced metering.

It is, in fact, one of the elements that

he believes strongly, in conjunction with efficiency and renewables, demand response. But as an initiative it is important to moving us forward to achieving those benefits.

The things that Art talked about earlier regarding capturing the price elasticity in the marketplace, and how do we communicate that value, and how do we capture that value.

What I thought I'd start by telling you is, first sharing with you a story of an actual vendor in the demand response business who told me about a problem they ran into one time. This is a true story. Don't need to make this stuff up.

They had a series of clients right across the State of California, and they needed to get the meter data in order to do the settlements on the demand response reactions that they took.

And in order to do so they had to change the meters. So they went through and it was a cumbersome procedure. It's not important who the utility is or the company is. But in the process they have to get all the signatures on the form, and they had to change the form to get access in order to get the information and fill out the forms. And they filled a separate form for all

these meters and they submit that process.

And they get it in and they have to pay for the meter change, which they're willing to do in this case, it was important to them. And after this is all said and done, the utility went out, swapped out all the meters, and they said, great, can we access the data.

And they said no. They said, well, why not. They said, well you don't have the right information. You don't have the access. They said, well, what's the problem. They said, well, the form here that you filled out has a different meter number. Well, we changed it. You have to go back and fill out new forms with the new meter numbers. You got to be kidding.

And that was the case. Now, that obviously prompted a change in procedures, but I think it illustrates the difficult. Because what they originally were told is well, the data's available online, meaning you can look at it via web browser. And data certainly available online is interesting. But it doesn't necessarily meet the definition of what's useful.

And by that I mean how can you actually connect that information into other systems, this

issue of inter-operability. It's not sufficient simply to log on and say I'm going to download an Excel file, but how do I pump that data into my systems in real time. How do we make better use of that information.

And so what I want to focus on here is really what are the policies around information access to insure that we are getting towards inter-operatability in capturing the most value that we can from the system. Because obviously there are many different perspectives.

I think Dian had mentioned, it's been -- or somebody else -- 30 years we've been hooked on the meter. I'd argue it's closer to 130 years. You know, here we are in the 21st century and to a large degree still doing some meter reading, not all, but the way in which it was done a long time ago when utilities first started out. They send somebody out and they record manually, or in the case of hand-held readers, now, the readers got a little more sophisticated.

But when I say it's done, I think that was really driven home, because a couple years ago I was involved, went out to a site and were hooking up a wireless router with a dynamic IP

address to a serial output in the back of an advanced meter. And right next to it, in this little shack, which is where this meter was housed, this customer, was an old journal from 1947 in which the utility would go out and literally handwrite meter reading and do the math in the book. And then transfer that back, and then take that back to the department to do billing.

And to some degree we still have, you know, I think what people like to refer to as handcrafted bills for some of these complex rate opportunities.

But we need to move to a system where we have the opportunity to take advantage of that standardization.

So, if I were to ask you what are the following things you have in common, and by that I mean, if you think about airlines, the New York Stock Exchange, hotels and a new car dealership -- industries. They all represent businesses that operate on a clearinghouse model when it comes to data.

And by that I mean in the airlines you have a Sabre system for common collection of

information on flight availability by which we can all make use of Expedia and all the other online. And it's very efficient, very convenient. And there's a lot of businesses that have grown up around, providing an interfacing to that data.

In the case of the financial markets obviously you have the collection and the information of stocks and financial data. But also you can aggregate, you buy stock representing different sectors of industries, however you want. But it's information that's made available in a central location for the purposes of deriving new value, new products.

In the case of hotels you can go on to, and the last minute, find out about hotel availability. Take advantage of the last-minute discounts in pricing.

In the case of the new car dealership, if you want to walk in and buy a new car, he's able to go and check your credit, which is centrally reported to a credit bureau in order to facilitate an economic transaction.

They all make use of centralization of data. Second, if I asked you why is the internet so successful, I would hope that the answer comes

back, it's standardization. The fact that people can agree on how we exchange information between each other that allows that internet to become extensible. So when we talk about the worldwide web, it is that standardization agreement that we have that again has enabled us to do and see products that no one would have imagined possible even several years ago.

And then if I said, what lessons can we learn from the fax machine. Well, think about that. The fax machine is an example of the benefits of network effects. And by that I mean if you were the only one with a fax machine, it doesn't do a lot of good. If another person has a fax machine, I get some value. The more people that have fax machines, the more valuable that becomes.

And what I'm suggesting here is when we think about meters the notion of only replacing some meters and not the other meters doesn't make a whole lot of sense, because you'll never get the benefit of network effects.

So I want you to think about these issues and we talk about the policy. So what is the need for the policy. The policy has to

promote and accommodate technology changes. As Ron had indicated, the only thing we know for sure is technology changes. Constantly. We can't begin to imagine how those devices -- we could be looking at meters in five years that make use of broadband over power lines. We don't have to have wireless connectivity.

It can actually be done a different way. Maybe it should be done a different way. But what is important is that the information obtained from those meters and the price information available, whether it's a control signal for demand response, or the price representing the real-time price in wholesale energy market, need to have a way of making their way out into the marketplace where people can make use of the data.

And I think, you know, a little bit of history here in California, for those who may not be aware, people began to wrestle with this issue back when deregulation first started. In fact, the PUC decision was a decision on the 81222 back in December of 1998, in which each of the utilities were asked to provide two methods for allowing customers access to output from the back of a meter; or get access to this data for EMS

purposes.

And they each came up with a different option. They could have a customer-owned meter; you could have a dual-socket meter; you could have a read-only, perhaps, access. But they all agreed on a common output, and that was a pulse output, a little voltage on the back that you have to feed into an EMS system.

Now that's pretty lowest common denominator, but that's not a very efficient way of getting the customers access to that data in real time when it can be used for other purposes.

And I think I've seen presentations, in fact, Chris King gave a presentation one time, talked about why policy needs to keep ahead of technology. And the example was the Gatling gun. You know, used to march the troops right up, and then when the technology changed, boy, that wasn't a real efficient way of doing business anymore.

So, why is open access to data a fundamental tenet of energy policy when it comes to this issue. Customers have paid for this. They have a right to this data, subject to the appropriate security and confidentiality requirements that are necessary to put them in

place and protect that.

What's changed since 1998? I think that's what you'll hear this afternoon. It is, in my opinion, distributed -- it is the movement towards open source and standardization; and it's the web services and XML that promote inter-operatability that now allow us to exchange data between disparate systems connected in different places and different times.

We talk about the benefits, though. There are many different perspectives. And when I speak of benefits, demand response, to me, is simply one application of how I see this data being applied. From the utility perspective, having access to this data and standardization allows them to select competitively between different customer relationship management and software providers. It doesn't lock them into proprietary systems. It allows them to offer things like perhaps better outage detection, improving levels of customer service. Remote connect and disconnect, to the extent that that's a feature that's added in there.

From the customer, they're interested in, as Art indicated, the ability to wake up every

day at 6:00 in the morning; go to the wall and see exactly how much energy used overnight. I'm kidding, Art, most of the people probably don't do that.

(Laughter.)

MR. DESMOND: But I'm sure you do.

COMMISSIONER PFANNENSTIEL: Art would.

MR. DESMOND: Art would.

(Laughter.)

MR. DESMOND: And Art would be willing to pay for that. And there's a company that will offer that.

But it's also about simplified billing. How do I make sense of a bill. I mean the one thing that we heard back from the statewide -- pilot report that, for those of you who attended that workshop -- was that customers don't understand what energy bills represent and what they mean. And the ability to have more logical easier-to-understand pricing, the same way you have weekend minutes and nighttime minutes on cellphones. They ought to be able to have that to be able to make more rational intelligent decisions about investing in solar systems or conservation or any of the other technologies that

are available to us.

Even at the wholesale market, the ability to link retail and wholesale markets in near real time allows you to minimize the amount of credit collateral posting requirements, because you can see what is actually being done.

And so there's also ways of reducing the amount of money and saving on interest charges and having faster settlements and simplifying the ISO's billing all by focusing on these lowest common denominators around energy. And that is the kilowatt hour and how we define what that is.

There are plenty of other things, too, that we can't begin to even imagine. The services that could be offered by energy management companies in terms of predictive maintenance or identification. Or aggregation of that information over time.

It's not just about California. It's about the retail chain that has 3000 stores across the United States who's looking for a common platform. It's about the group of customers who are interested in perhaps getting the aggregation, but really don't understand their load profile, and therefore can't offer up or focus in on what

their community could do to be more efficient and to promote perhaps green power.

Forecasting, intelligent agents, demand response, these are all examples of services that we have. What we do know, though, is that the typical reaction -- and I don't want to suggest here what it is or it isn't, but we look at other industries, it's fairly common. And that is a very strong resistance to the idea of opening up data.

Look at the entertainment industry. They fought tooth and nail for a very long time, even when it came down to rights over content, like movies, VCRs and DVDs, and yet today it is the largest contributor to some of their revenues is in the aftermarket of those products.

It's no different in real estate with listings. How many of you have sat around and looked at how many houses there are for sale in your neighborhoods because that information is now posted facilitating you. Still you work with a broker, but they're able to do that more expeditiously and give you greater view of the products available.

And certainly in telecommunications,

about the phone. AT&T did not go willingly into that dark night when it came to the break up of the utility. And yet today who could have thought 20 years ago, caller ID, caller ID block, call waiting, call forwarding, three-way calling, these are all added services for which they charge, and which, I believe the utility could charge on revenues for similar types of services that they could offer up. There's nothing wrong with that.

What we need to do is to enable that to happen, to evolve. We can't sit here today and begin to imagine the types of services that will be offered. But they only come about by being able to make use of this data.

So, with that, I'll close with a few final thoughts. Clearly there needs to be a focus on security and confidentiality. It's no different than credit card information, having secure transactions. But I want you to know that those technologies are there today and can be put to use.

The implications here for vendors, whether it's hardware, software, think about the inter-operability or interface layer you have to provide if you're going to be selected. Because

that will be the requirement to make that data available. How the customers get information about how this could be used.

And then lastly, this is not, as I said, California. This is a national issue. And I had the opportunity to talk with both the Chairman of the New York Public Service Commission, the Chairman of the Massachusetts Department of Telecommunications and Energy, and other states, and there's probably about eight states, all of whom are pushing in the same direction right now, looking for a sense of where do we go. And those states include Massachusetts and New York, California, Wyoming, Maryland, Texas -- did I cover them all -- and Utah.

So there is an opportunity to take this initiative well beyond California. If we're going to do it here, as I said, this is not California market only, but it stands to benefit all consumers across the U.S. whether or not we're dealing with a regulated or an unregulated market.

So, having said all of that, you now have a sense of the vision. And I'm looking forward to the presentations this afternoon. Thanks.

MS. TEN HOPE: Thank you. I'm going to ask Erich and Ron to come up and join me and we're going to open it up for questions. First I'm going to ask if there are any questions on the dais, and then we'll move to any questions from the audience.

If you could, because this is both being webcast and recorded, step up to a microphone at the podium and announce your name and your affiliation. That would be very helpful.

Any questions on the dais?

COMMISSIONER PFANNENSTIEL: Well, let me just ask Joe whether his comment about AT&T being dragged into this has anything to do with the current situation that AT&T finds itself in.

(Laughter.)

MR. DESMOND: Not necessarily.

MS. TEN HOPE: Any other comments?

MR. MESSENGER: I have a question. One of the things that I think we have to address in this community is to what extent you want regulators involved in a design process. Or to what extent you want the regulators to just step away from reference design, say, go off and do it and bring it back to us when it's done.

So my question is to Erich or to Ron, to what extent in these examples that you've cited, the cellphone and all the other examples, was there a clear regulatory input, or perhaps input from the buyers early on, and then they stepped back and waited to see what the sort of vendors could do to come back in terms of bringing a reference design?

Or is it the other way around? Did regulators in some way, shape or form get involved in these reference design processes?

MR. GUNTHER: I can start and I'll let, you know, Ron, fill in. In most of the examples I gave, you know, clearly those were market-driven related items. So there were other drivers there. Someone saw a need for a market; came up with some innovative products. For whatever reason the idea was a good one. And either early or later in the process all the players, you know, saw the need for reference design.

This one's a little bit different in that, you know, the requirements for doing this are driven by policy, by public policy. And so we need to find a way to map that public policy into a set of minimum requirements that can translate

into functional design, detailed design, and the like. So it's a little bit different from that point of view.

There are some exceptions. Many of the aspects of automatic teller machine devices, there are regulatory associated with some of those things. But for the most part this is a little bit of a different animal.

Ron, you got another example?

MR. HOFMANN: When I was doing the research to set this project up, what I managed to find is that there are no regulatory examples that I could find. That almost every example, even when there was a regulatory business involved, it was all driven by industry.

And so, as several of you know, I've tried to emphasize that industry should, in fact, lead the way here. And you'll hear this afternoon about one industry consortium that's forming called OpenAMI, that may be the vehicle to get the reference design started.

To answer your question more directly, I think, Mike, that this has to be an interactive process. I think we're going to be setting some new ideas in play. Having a regulatory vision, as

opposed to a market-driven vision. And I think we're going to be learning as we go.

MR. MESSENGER: Thank you.

MR. DESMOND: Mike, I just want to add relative to other initiatives that folks are probably aware of, in the case of Australia, that's a market that is very efficient. They actually adopted something called ASEXML a number of years ago which provides for a lot of this.

I mean I'm a huge believer in not reinventing the wheel here. And so I would point to things like the work that's been done on taking the decade tables and the NCC-1219 and looking how they've been trying to convert them into XML schemics, or the use of ASEXML in Australia, essentially to move information back and forth between market participants at the wholesale and retail level.

And then at the national level here, the National Association of Energy Standards Board. It's one of the technical subcommittees that is part of that effort that came out of the Gas Research Institute, has four quadrants: wholesale and retail electricity and then wholesale and retail natural gas. And there's an effort there

at standards.

So there's actually quite a bit to draw from here in addition to some of these other actions, that we're not really starting from scratch. This is really just a decision to commit to a process and the tools are there.

MS. TEN HOPE: Veronika, you had a question earlier.

MS. RABL: Yeah. Do these mikes work?

MS. TEN HOPE: They should.

MS. RABL: I'm Veronika Rabl, independent consultant. And the question is about reference design. Specifically why do terms like functionality and user interface not enter explicitly into the reference design?

Is it because that in general the equipment is already on the market, and the reason for reference design is that there are other vendors who want to enter the market and broaden the market?

And perhaps that also relates to the question that Mike asked, which is that perhaps the role of the Commissions is to set some basic functionality, and then let the market and the reference design deal with the rest.

But anyway, still a question. Why is it they're not explicitly. I see equipment and hardware and software --

MR. GUNTHER: It's a very good question, and that actually is one of the most difficult things about establishing a reference design, is how far you go in defining details.

You need to define enough details in user interface, for example, to stick with that one, so that, you know, you have something common that everyone can relate to. The cellphone example that's got, you know, a minimum set of buttons that we know to expect, you know, to be able to use that device. Or the ATM.

We could define in the reference design an exact layout, or say that there shall be no more or no fewer than this number of buttons. The problem is that we reduce the ability of a vendor to innovate. And the more detail you specify in the reference example, the fewer legs that such a design, you know, has over a period of time.

And this is the real very very hard part about doing this, is why just one person just can't sit down and write something out. Any competent engineer can sit down and solve one

particular problem and make it work.

But having something that is generically applicable over a very long timespan and allows all the players to innovate and come up with new products and still be compliant with that reference design, that's a very hard task.

So, it's in there. It will be in there. It certainly is not defined in the strawman we put together that I'll talk about this afternoon. But, you know, we have to decide, as an industry, just where we're going to draw that line.

MS. TEN HOPE: You need to go to a microphone.

MS. RABL: So perhaps just to clarify the question, I wasn't really asking about a number of buttons. I was asking why is the fact that the cellphone should allow the user to dial an x-digit number. Why is that not part, explicitly part of the reference design, whatever the number of buttons?

MR. GUNTHER: It very well may be. We just, you know, it certainly is possible. But it's going to be a collection of a lot of people trying to figure out, you know, where we'll draw the line there.

I mean will a reference design say that you're going to have 15-minute interval data, no more, no less. Well, should the reference design instead say you will facilitate having a range of intervals that you can support in your data.

It's a matter of consensus to figure out just exactly where we're going to draw the line in that point of view. So, it can. Other reference designs do go to that level of detail.

Ron, you --

MR. CAMP: Hi, Ward Camp from DCSI. I guess my question is along the same lines. I heard two -- what I heard, different versions of inter-operability. And some of those -- that were in the permanent standards were grouped, grappling with meters back in 1998 for direct access. At what level is inter-operability?

What I heard from Mr. Desmond was depending on data, so that it could be useful to use. Disparate systems nonetheless being able to talk uniformly.

Whereas when you start talking at a product level, it starts sounding like uniformity of systems.

And when we're in a -- the technologies

that are available right now, including the lower orbiting satellites, telephone, power line communications, wireless, when you start talking at a product level of inter-operability I see a big disconnect handing off data, no matter from what system it comes from, that can be used and useful to both consumers and the utilities makes a lot of sense.

So, if you could address that. At what level is inter-operability?

MR. HOFMANN: This answer actually it carries over to Veronika's question, as well. I think, in thinking about this, less is more.

These decisions need to be made by the industry group. The key here is once you've embodied the vision, before you get into the details at the reference design level to constrain it, the more of a problem it's going to be down the line.

So, I would say that you let the standards groups deal with things. You're not trying to get down into that fine detail at the reference design level. the reference design level needs to be something that guides the market, guides the vendors, guides the utilities,

guides -- lets customers know what they're going to have.

I apologize to the Commissioners that we didn't, in fact, focus on the customer side of this. But the issue is that the reference design helps customers know what they can expect.

So, less is more. I hope that answer helps you. And in the end, I think what you want is you want the industry group, when they put the reference design together, to decide how deep it's going to go. And hopefully there will be some real innovators there that will keep you from getting too deep, because that's not the purpose of the reference design. That's the purpose of standards, functional specs, et cetera.

MR. DESMOND: Ron, if you don't mind, I'd like just to add a little bit to that. Working backwards, if the problem we're here to talk about today is demand response, there's, in my opinion, only three key pieces that you need to solve.

One is a way of describing energy data in a common format, is it kilowatt hours, and what does that look like. And the second is how do you describe a price. It is U.S. dollars, is a --

decimal, a way of describing the price information. And then the control signal, you know, start, stop, duration, amount, and all the things in between.

But, you know, you can work backwards at that level, and, in my opinion, makes no difference what hardware you use or what meter you use, or anything like that. Just people can say, all right, I know how to interpret a price; I know how to interpret meter information; and I also can understand a common language when describing demand response requests, economic or reliability based.

And I actually don't think it's -- we don't need to make this more complicated than it has to be.

MR. HOFMANN: I want to add something to that, which is you'll notice this afternoon in the presentation that we stuck with a strawman design for information exchange. That wasn't an accident. We did not go any deeper than that.

If the industry group decides that there's some good reason to go a little deeper than that, fine. But the point is that what we were trying to do is what Joe was trying to

describe.

We tried to give you a strawman to say if, in fact, you took those three issues that Joe's talking about, here is a model. And from this model you may be able to develop a coherent reference design. And we've drawn a strawman up there which people may hate, but that's fine. It'll probably get people thinking about what the level is; what kind of information has to go into the reference design.

MR. DESMOND: Ron, I'm sorry, one final note. The old reference design, if you will, on meter data was CMEP, California Meter Exchange Protocol. I mean it's a nancy way of describing that. MDEF was another one, Meter Data Exchange Format.

But as I said, we've moved beyond that. We have to update those ways of describing information so that a piece of software can make a query to a remote database and get back the information it needs, and then pass that off onto another application.

MR. GUNTHER: Just one more point I wanted to make was about the inter-operability comment. I heard the word inter-operability sort

of inferred, one point of inter-operability sometimes.

Any good reference design for a large system, especially one like ours, or like an ATM system, has many points of inter-operability in the system. There are a variety of zones or objects that have information that need to be exchanged with other ones.

So there's just not, you know, this part of the system, and then this part of the system, and we're going to try and figure out where we put the line to communicate. There are many different parts of the system where we need to define inter-operability. Databases for one example. Customer interface, customer information systems.

The interface between the customer premise and a network, we don't care what the network is, whether it's satellite, cable or DSL or, you know, whatever, it doesn't matter. But the interface between them should be defined.

MS. TEN HOPE: Richard.

MR. SCHOMBERG: Richard Schomberg from Electricite de France International. Ron started his presentation by saying that the reference design could be a document or a process.

I think I have a quite good view of what the document could be, as it was really well presented by Erich. But if you could give ideas of what a process would be.

And there is a second part of my question, which is do we envision in the reference design to define human communication language with end-users? I mean to define some concepts about tariff and mechanism and the simple data package that would be the only thing to be presented to end-users.

And that, I think, would help considerably to have two type of discussions. The discussion of the users and consequences for them. And, of course, the benefits that are expected. And another type of discussion which is the technical discussion.

MR. HOFMANN: I absolutely believe that the reference design will be a document in the end. But the reason I said that I also believe that it's a process is because of my expression before, which is that I don't think in this industry we know exactly how to get to a reference design. So, part of this reference design is going to be defining the process by which an

industry that's highly regulated helps create the reference design.

And some of the things that I think will come up more in the discussion this afternoon is the idea that if an organization like OpenAMI comes up with a reference design, how does that iterate back to the regulators so that they look at the document that's produced and they say, yes, this reflects the policy and vision that I had in mind. And, yes, this does not restrict this. And, yes, it makes the consumers have the ability to get their data and so forth.

So that's why I mentioned that I thought in our particular case there's going to be a process part of our reference design.

And then on the other part of your question, I agree with you that this thing, I think, will have a long-term life, because beyond the initial questions of inter-operability for the data for DR, there will be a lot of other applications that require reference designs down the line. I'm hoping that industry will take the ball there. That isn't something that I believe should be done by regulators.

MS. TEN HOPE: Ma'am, did you have a

question?

MS. SCHILBERG: I'm Gayatri Schilberg with JBS Energy representing TURN, The Utility Reform Network.

My question has to do with process. Because I can understand the merits of creating a reference design, and that normally that's done by industry. And one of the benefits, as we've heard Mr. Gunther say, is that the costs of the technology then would come down.

However, at the same time we're engaged in a PUC process where in six weeks utilities are going to be filing their proposals of what, if any, kinds of meters and communication devices to be rolling out.

So what I see is it would be very possible that the utilities implement a roll-out of whatever scale, and then a reference design comes along that contradicts the technology that they've implemented. And this is then a recipe for stranding the costs that are likely to be rolled out as a result of the March 15th filings.

So, I'm very confused how this reference design is going to play out with the PUC process.

MR. HOFMANN: I worry also about those

same things. But, the plan is to try to not interrupt that process, and try to create enough of a reference design at a high enough level so that everybody agrees they're on the same page.

Here's the counter-issue if you don't do a reference design. It's not all together clear to me, being a technical person, that the regulations that I have read that have come out over the past year or so, are clear to designers.

I'm of the opinion that the utilities see some of those regulations differently, and that we will not have inter-operability to be able to deal with the next crisis that we have in the state, whatever it is.

So, I don't think, and I'm hopeful about this, and this afternoon when you hear the presentation on OpenAMI, IntelliGrid, on GridWise Alliance, hopefully you will see that enough has been done already that maybe we just need to bring the pieces together over the next six weeks in parallel to be able to just convince ourselves that we're all talking about the same thing.

That may be all that the reference design has to do in the next six weeks. If everybody from the technical side and the policy

side can agree we're talking about the same things, and that we will not have a stranded asset, and that there hasn't been a misunderstanding that sometime in the future something will be required in a rate structure that wasn't considered at the moment, if we get to that point I think that we will have done our job in the next six weeks.

Then over time it'll have to be formalized.

COMMISSIONER GRUENEICH: I actually had a followup question or comment to what Gayatri had raised. Because I was thinking even in advance of your comment where the presentation had talked about what the reference design is doing is implementing essentially a decision from the PUC. That's the way that I read that.

And whether, since this is, as I understand it, the first time this whole process is going to be attempted, how there can develop an understanding, much less a consensus, as to the level of detail that would be needed in a PUC document in order to best work with the reference design.

As I understand it, we do not have a

template where we could say, here's the level of detail guidance vision that really works best with a reference design.

And so I'm interested in any perspectives that anybody has, including Joe or Julie, that can help me understand, as a newcomer at the PUC, as this process moves forward how there can be communication to insure that whatever the Commission ends up in its next level of decisionmaking interacts best with the process for reference design development.

MR. DESMOND: Dian, let me respond to some of that. Actually it's great that you asked the question, because it has to be resolved now. But I don't think it's as difficult a question or way to resolve as perhaps it might seem. And let me explain why.

As we talked about the three components of it, references I hear dealing with price and a control signal and meter data, the price and the control signal have nothing to do with the PUC's decision regarding meters. When I say they have nothing to do, there's nothing that requires or necessarily has to require a meter to respond to a control signal. The meter's not the one that's

hooked up to a building. It may be capable of that, perhaps, but the objective is to be able to collect that data and store it, forward it on and validate and all the other things that meter needs to do.

So it really comes down to the software providers' ability to provide interface to a query for meter information. And at what level and what frequency that data needs to be made available.

So, it's really simply, in my opinion, an update of that 981222 decision which goes on to say whatever system is selected that that software vendor must provide an OpenAPI to allow for these queries to be made, subject to a process that will define security and the confidentiality and all those other things that can come from a series of workshops.

But it doesn't have to be specifying at the level of functionality on the meter; rather it's the system that they would have to make available.

So that, in my opinion, is something that's easily incorporated into a decision by the PUC.

And then you set the direction where the

utilities need to work carefully. And I appreciate the last person who spoke. You know, there's a number of ways on the business process now that we could focus on. And a way of describing, I don't know if it's still as widely used, but BP -- excuse me, WS or BPL, which is Webservice or Business Process Language, one of the ways in which you can describe a process in a way which everyone can understand and communicate.

There was some early work done on this. I'm sorry to be so technical here, but way back in the early days of this by, I think it was Excellergy, who focused on RosettaNet and a series of procedures around, you know, standardization on process flow. You know, whether it's customer hookup or disconnect, or switching. But there's a process element here. That can get worked out. It's just agreement on the basic functionality the system has to be capable of providing that interface. And that's done at the software database, doesn't change the meter technology or the meter decision.

MS. TEN HOPE: I think this will be a good question to revisit at the end of the day. And I suspect that Mike has captured this, and may

be asking for participants in the audience for some --

MR. MESSENGER: I can just tell people that people are using different languages and speaking to different topics continually, but that's fine.

MS. TEN HOPE: Well, that's the part -- that's beginning the dialogue here. Dave, I think you have a microphone right in front of you if you'd like to just --

MR. WATSON: Yeah, my name's Dave Watson with Lawrence Berkeley National Lab. I have a question that kind of relates to both Mike and Dian's comments and questions about to what degree should regulators or visionaries be involved in the process. And also what type of detail is required to create these systems.

I'm sure we'll talk about this later today but usually use cases is a key way that these types of systems are designed. They don't need to be detailed, they don't need to be technical and have the alphabet soup of letters in them.

But I think, from what I hear, the most important aspect that describes the degree that a

regulator should be involved in is are there use cases that benefit the public that industry might miss. And if so, those are the use cases that the regulators and visionaries need to supply to the process.

And then maybe for this afternoon, what are they.

MR. MESSENGER: And can I build on that really quickly because I think we need -- I really want to try to present some context between this PUC proceeding that's been ongoing for two years and this meeting.

In my mind, the PUC and the Energy Commission, when they put out an order about a year and a half ago, defined six use cases that they thought would be useful for the public to have.

And then since that time there's been other people who developed other types of usage and things that they want, which is fine.

And really what I think a reference design probably needs to get to is hearing from all of the sort of users of the network, what their use cases are. You know, you've heard some from the regulatory bodies, at least in partial,

now, what their use cases are.

An example is they want the system to support different kinds of tariffs. Okay, that's a use case. You can lay out what the tariffs look like and what you need to support them.

But it may be that customers have a different kind of use case, you know. I want my energy management system to be able to use this data and give me information about what my monthly bill is going to be, you know.

And it may be the utility manager has a completely different use case. I want to know when systems go down and where they are so I can fix them quickly, you know.

So the point is that what I think may not have happened yet is that all of the users of this network haven't clearly presented what their needs are in the future. We've heard from some different parties. We need to hear from everybody before the industry goes off and creates the reference design to make those things a possibility.

MS. TEN HOPE: Time for a couple more comments or questions? The gentleman in the back and then --

MR. VINCENT: Hi, I'm Brad Vincent from SMUD. I don't have a specific question on a reference design, more on the proceedings in general.

I've sat through some of the WG3 things, meetings, and I'm having trouble finding a correlation or development of what's the requirement, what are we trying to do. And here's various ways that we can get there. One of which is AMI.

I listen to the vision of an automated household and that's cool, technology's great. But that's $500 a house or whatever it is. $5-, $6-, $7-billion for California.

We seem to be steamrolling ahead here. Where's the decision process as to the business cases which have been largely negative so far? They certainly may look different in six weeks. It may not.

How do we get to decide whether it's cost effective to do, what functionality is required, what's nice to have, and what's the requirement? Is the requirement we want a 5 percent peak load reduction? If so, can we look at other ways of doing it?

I'm kind of confused in the whole process of getting to where we are now, already looking at platforms to go do this. So I have a more basic question there.

MR. MESSENGER: This is a scope question. I really don't want to argue the other proceeding in this workshop, so I'm not sure to what extent you want me to answer that question.

I mean I'm happy to do that, but I don't want to spend all my time discussing, you know, the intricacies of benefit/cost analysis and when the PUC is going to make a decision and all that kind of stuff.

MR. VINCENT: Well, not the intricacies so much, it's just the top level decision. What's the requirement, what are going to be the decision points, how does this fit in?

MR. MESSENGER: Just the details, okay. Well, from my perspective there's an ongoing proceeding and they've asked utilities to file some information on what they think the benefit/cost analysis shows for different types of deployment of AMI and dynamic rates.

The Commission will then make a decision whether to go forward with any or none of those as

a result of that.

What I think this process is, is they're talking about regardless of what happens in that decisionmaking process, for the people who, for whatever reason, decide to go ahead with deploying AMI networks, what can be said or what can be developed that will help vendors bring those products to the marketplace.

And so, you know, to me it would be a possible outcome, not that it would be likely, that, you know, the PUC may decide, hey, you know, none of these systems are ready yet. We don't approve anything. And the reference design process could still go forward. Probably with less interest, I would say, but I'm convinced that these decisions about when or where to deploy advanced metering systems are just happening slowly in different places. And you won't know when the final decision is, the full decision has already been made, in essence, you know.

There are utilities, for example, that are deploying AMR type systems without even talking to the PUC. They've already gone in and done it. So, I'm hoping that we can divorce -- my central message here is you can divorce the

process of technical development of systems from this regulatory process of what the utilities should do.

MR. VINCENT: I don't see how you can when one of the outcomes of this perhaps is a significant reduction in the cost per point of a deployment. It doesn't seem like you can do them just independently of each other.

MR. GUNTHER: Well, one of the things that will come out of this, I think maybe it will be a little bit clearer after we do some presentation of the strawman reference design this afternoon, is we start off with some very high level guiding principles that a lot of us in this room would say they're common sense architectural things. The system will be extensible, you know. You know, we can support these different rate structures. It needs to evolve.

There's some very high level things that really, what we call architectural principles. And we don't have to invent those, either, because as we'll hear this afternoon there are several projects, work that's been done to establish many of those high level principles.

And then we get a little bit more detail

below that using standards-based, you know, interface approaches and the like.

So there's a way to map, you know, the proceedings that you're talking about to these principles in a timeframe that will let us evolve quickly, if we need to, or, you know, more staged if it works out that way, you know, to result in lower cost systems that aren't stranded, that are inter-operable and meet these high level, you know, policy goals.

It's been done in other industries. The power industry tends to follow along a little bit later than other industries. But we finally figure it out, and I think we can do it here.

MS. CLEVELAND: My name is Frances Cleveland from Utility Consulting International. I guess one of the things that I'm picking up here is that in reality there seems to be a sense that the reference -- that one group is looking at the reference architecture as basically an interface with a meter, a smart meter, or has the ability to monitor, to do issue controls.

And that's a very very basic process. It doesn't need anything to do with regulators; it doesn't need to do anything with even what the

customer wants; it's just kind of a basic process.

And it sounds to me like we could deal with that fairly quickly in terms of a reference design. But once we get beyond that, sort of at an upper level where we begin to talk about systems and, in a sense, the regulators are taking the place of the customer. Because usually in the other industries it's the customer who's wanted something, and therefore that's what's moved forward; and the vendors have responded to it.

At this point sort of the regulators are taking that role, partly, it seems to me, because the customer doesn't know what they want, or can do yet.

But it seems to me like maybe a way to approach this is to get the low-hanging fruit first, the basic simple interface to the meter. Get that done. Then start working on use cases, more complex things. See what the vendors can provide once they have that basic interface to the meter.

MS. TEN HOPE: One last comment this morning, and then we'll have more opportunity this afternoon for dialogue.

MR. DOMINGOS: My name is John Domingos;

I'm an attorney and investor in this industry. And I think this is a critical first step in leveling the financial playing field between generation and demand response.

Because when I heard some gentleman talk about $5- or $6-billion, the amount of money invested in generation capacity in order to meet our needs always comes in terms of billions of dollars. And if it's the loads that we can manage more effectively, we first have to have a kind of an infrastructure on the load side that let's the financial markets step up and say, I understand what you guys are doing. And now that I understand it, I know how to put my money into it. And the rates of return in megawatts dwarf the rates of return in megawatts.

So, I think this is a critical process that I'll be watching and admiring and hopefully seeing some great results from.

MS. TEN HOPE: Thank you, everyone, for your comments. It gives us a flavor for the dialogue we'll continue to have this afternoon and hopefully at future meetings.

I'd like to encourage everyone to come back this afternoon and hear our industry

participants. We will start back at 1:00. And I would ask that the industry speakers and the industry discussants, if you could come back a few minutes to one so we could have a chance to talk before we start up again.

(Whereupon, at 12:00 noon, the workshop was adjourned, to reconvene at 1:00 p.m., this same day.)

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AFTERNOON SESSION 1:07 p.m.

MR. HOFMANN: We're going to be on a very tight time schedule this afternoon. We're going to try to hold to the schedule so that we can preserve the period from 3:00 to 4:00 for discussion. And there will also be a little bit of discussion at the end of the presentation between 1:30 and 3:00. And we'll try to hold to this very tightly.

I think what most of you will want to hear is what the industry groups have to say. We felt that a good way to lead into that was to present to you a little of PIER research called a strawman reference design for information exchange.

And I hope all of you know what PIER stands for. It stands for Public Interest Energy Research. It is the public interest part of the electricity R&D in the state.

Just to give you a little bit of background, I work for Laurie ten Hope, who you saw here today, and also work with Mark Rawson, who both works for Laurie ten Hope and also works for the Commission in the distributed energy resources area.

We started having discussions in 2002 to try to understand what R&D issues sort of broadly covered DR and DG, or DR and DER. And what we found was that there was a lot of commonality for controls, communications, integrations; that the issues seemed to be pretty much the same. And we might be able to share a research agenda in this area.

So in 2003 we asked Erich to develop a matrix for us, to do a little background for us on projects that were going on in the United States. We had him map them against our PIER DR and DER R&D issues. And that report is available. For those of you who are interested, I can give you the website where you can look at that report.

A consequence of that work was that we saw the need for the concept of a reference design in the C-squared-I area, in the control and communications integration area. And out of that came ultimately this workshop.

And in 2004 we asked Erich to create a strawman reference design for demand response information exchange just as an example. If it turns out that this is a useful reference design, that's great. But this was an R&D step to be able

to see what we can do with existing information that was out there, standards, initiatives like SEEDS at the time, now called IntelliGrid. You'll hear more about them this afternoon. And we tried to create a strawman reference design using existing knowledge based in the field.

So, this afternoon in just two minutes Erich will present the work that he did for the strawman reference design, and then we will follow that up with industry groups that represent the basis, that have been developing the basis for that reference design, and potentially continue to develop standards for that reference design.

But I just want to bring this picture up again to remind you that what we're trying to do here is we're trying to do a mapping between policy and the functional specifications that the IOUs present as RFPs or RFQs.

So, with that, I will bring Erich back and he will present his work on the strawman reference design.

MR. GUNTHER: Thanks, Ron. All right, basically what we're going to be doing here is going through a high-level overview of the report. The report is published on a couple of the

websites, so you can take a look at the details later. I can only cover really a fraction of the issues that are in there.

Start off first with a little bit of background as to, you know, why we're here with this reference design. In 2000/2001 we had the electricity crisis, which had a variety of contributing factors. The market power issues, the fossil fuel plant issue; of course, the flaws in deregulation -- Bill 1890, and just fundamentally a disconnect between wholesale and retail prices. So a lot of things that we can point at.

But most agree that one mitigating factor, that could have been a significant mitigating factor, was demand response. In fact, you know, you could analyze a lot of ways, but, you know, 1 to 5 percent, if you had maybe upwards of maybe 5 percent demand response, you know, we wouldn't have had to enter the long-term contracts and a variety of other things. So demand response could have played, you know, a really big role in mitigating what happened back then.

So, basically under the leadership of Commissioner Rosenfeld and the CEC, CPUC, CPA, the

IOUs, everyone has embarked on this path of encouraging demand response through price responsive load.

So, in support of that policy, Ron has alluded to PIER initiated a DR program for more related R&D. And one of those R&D initiatives, you know, is this report that was commissioned to take a look at creating this strawman reference design. And for those who haven't gone and looked at it yet, there's the URL for where that particular report can be found.

Just as far as, you know, a little bit further background into the genesis of this thing, a few key points. Implementing demand response policy requires implementing a demand response of infrastructure.

Basically we've got a wide variety of stakeholders here and there's just as many views on how that infrastructure could be, you know, deployed.

What Ron and others observed early in the process of those early discussions was that many, if not all, of those views were incompatible with each other. A lot of them were not based on standards of any sort. They were pretty clearly

not scalable. A lot of folks didn't realize that they weren't scalable, which is an issue.

And, you know, from the opinion of several people from the outside looking into this, you know, felt that it may have resulted in more stranded assets in the long run, you know, the last thing we want to do with a large rollout of a real true demand responsive infrastructure.

So the concept of a reference design, you know, has been used as we saw this morning in a variety of other industries. And that came to mind as a way of finding a way to mitigate this problem.

And literally it was, you know, the first step was, you know, a back-of-the-napkin-type concept that Ron had drawn up. Just scribbling out a few basic concepts. A concept of having an area or domain of open systems where we have complete open information exchange between a variety of different players in here, entities, the ISO, load-serving entities, distribution companies and the like, using open standards.

And so, you know, this was sort of the genesis of trying to go and put together some high-level architectural principles and a first

shot at what a reference design, you know, might look like, you know, in the long run.

The core here is inter-operability within a well-defined zone or set of zones, with recognition that we need to inter-operate with other systems, existing systems, through translation layers and the like outside of this zone of inter-operability, if you will.

So, one of the first things that we did was taking advantage of work that has been going on in the vendices, but now the EPRI IntelliGrid type work, was look at high-level architectural principles, and begin to define the fundamental characteristics of infrastructure in general, and maybe a little bit more specifically which aspects of that are applicable to a demand responsive infrastructure.

So, a good amount of the report really lays out these very high-level guiding principles. The high-level guiding principles, even if we agreed on no more than that, can have very unexpected benefits in designs as they go along.

So I just want to go over these. So a high level on here, start off with this share-ability. Basically common resources, like common

databases for example. Offer economies of scale; minimize duplicative efforts; and can result in, you know, competing solutions.

Ubiquity. We want to make sure that all potential users, all the stakeholders in any aspect of the system can take advantage of the infrastructure and what it provides. So it opens up a whole lot of potential applications, you know, if we meet that principle.

Integrity. So we have to have an infrastructure, you know, that has a very high level of manageability and reliability that, you know, it's really only noticeable if it (inaudible), and we want to make sure that that doesn't happen very often. Got to be easy to use; so that's pretty straightforward.

Has to be cost effective. Value's got to be consistent. There has to be a clear value story at all different points, points of inter-operability in the system. I mean, otherwise it just won't be built.

Standards-based. Basic elements of an infrastructure in general are the way they relate to each other, clearly define the stability, you know, that can be provided by standards. That

leads to openness. So basically the openness of the system is such that everyone can play. There's no, you know, secret handshake required to get in. It's available to all as long as you respect the standards and develop products and systems according to it.

And, of course, it's got to be secure. We heard, I think, that mentioned a couple of times. I think it's critical that the infrastructure be secure and we've got to deal with the issues of unauthorized access; got to deal with interference with normal operations and the like.

So those are some core, high-level guiding principles that of and by themselves really go a long way to narrowing down how you would design a system.

So, some key principles and goals that some of these architectural principles, you know, let us focused in a little bit further. Demand responsive infrastructure, you know, to provide a set of interfaces, transactions and services to support the envisioned demand response functions.

Needs to serve everyone. It's got to support concepts of free enterprise. The market

has to be involved here. Got to protect the rights of the users and stakeholders. And we've got to, again, promote inter-operability and open stance.

Okay, what's the purpose of the reference design. Basically we've tried to define it in a couple of different ways this morning. But just to sort of reiterate here a little bit, we want to establish a common starting point for implementing open information exchange for this demand responsive infrastructure.

Some key characteristics. Scalability, inter-operability, we want to foster innovation. We want to be able to, you know, handle the better, cheaper, faster, you know, mode of things here.

Also need to maintain compatibility with existing and proprietary systems. We would recognize that there's a lot of systems out there, and one needs to establish a reference design that respects the fact that there are, you know, in every aspects of this infrastructure there are existing systems that we have to work with.

If we can do this we are able to, you know, maybe guarantee is a strong word, but come

very close to guaranteeing regulatory bodies the ability to develop tariffs, programs and other currently unknown initiatives, and be able to implement them. That's a very important goal.

And we want to be able to take advantage of this to protect the integrity of the power delivery system in California. That's clearly a very important goal.

Just as an example in the emergency load curtailment area, and presently the ISO has no idea of how much (inaudible) capacity's available, you know; how well or did the system respond; was it enough to stabilize the system. You know, these issues, the command issues are different, are issued in different ways and different IOUs to implement emergency response measures.

Each IOU sends then a signal to their subscribed loads, using all manner of different methods, with different latencies and different methods of getting feedback.

A possible future, you know, will enable, you know, the providers known to the ISO, through a common information system, to, you know, basically understand what the expected response is, and the delays would be.

The ISO could use a simple single signal, standardized to everyone, all the providers who subscribe to it. Standard interfaces to all the subscribers, you know, below that hierarchy.

And another really important aspect of this is, you know, regulators could be able to audit the program effectiveness, and the actual performance to, you know, get the feedback into the policy side of things, you know. Are we accomplishing the high level policy checks.

So, that brings us to the strawman reference design. It's a thick document. A lot of different things in there. You won't find, you know, a lot of detail on user interface and the like. Or specific protocols and the like. It's really a very high-level view of these guiding principles.

Some of the core guiding principles include the concept of zones of information exchange, where we showed in that figure a little bit ago we've got the domain of open information exchange. And then outside we've got existing and proprietary devices.

Between those we've got a set of defined

interfaces. And that's the reference design is really the set of implementing standards and technologies necessary to implement or effect those interfaces.

There are several components to a reference design. Actors, applications, protocol, language, objects, translation and security. You know, who are the entities that need to communicate. What are the applications or functions that need to be performed by those entities. The underlying communications you use to move the bits and bytes around. The language that's used.

Object definitions, you know, a high-level description of the entities that you want to communicate with. They're independent of protocol and language, an important architectural principle. Translation services, again to deal with existing systems, proprietary systems, and of course, security.

So those are all key components of the strawman reference design that we have here, just to be able to focus our thinking on this.

So, basically we refined Ron's original picture a little bit to include the concept of

maybe, of databases, maybe the concept of centralized databases or what look like centralized databases. A few other entities that we added to the system. Customer is clearly added to this figure with respect to the comment we had earlier. So, you know, the customer side, of course, is critical in here.

And the open system elements really are a definition of protocol, language, objects, transactions and security. We listed a few examples here. So, examples of protocol: TC P/IP, the protocol of the internet.

Language, you know, Joe mentioned XML earlier. Objects, there's a number of standards that already exist and to find ways of defining objects in a standardized way.

Transactions, you know, things like EBXML, we'll maybe hear some more about that. And security. All of these technologies exist. We don't have to reinvent, you know, anything here. What we really need to do is figure out how to map policy to functional requirements to good technology selection to implement a design. And how far we go with every level of that, you know, is something that, as I discussed earlier, you

know, is what we have to figure out in the collaborative process here.

So, interfaces and transactions are a really key part of this whole thing. I mean information exchange for anything, including demand response, is specified really in terms of interfaces and transactions, you know.

What are the points of interaction between various components; between the meter, for example, and a collecting network. You know, between a database and those constituents who need access to the data base.

So, basically any new system capability will have to connect, be it existing or standard interface, even if some of the properties are tailored to the specific nature, you know, of a service. This is sort of a core principle here. So, we have to do a good job of picking those interfaces; allow them to be generic enough such that they're extensible, but specific enough to be useful. So it's not an easy task, but it's one that, again, has been accomplished in other industries, and I think we can do.

It's really important for those interfaces and models to be open, so standards-

based, so they can evolve. And we need to specify the underlying services, information, objects and the like, you know, that goes underneath that.

A lot of technologies I alluded to earlier, so I'm not going to dwell on this. There are several technologies that can be applied. This is just an example. Don't get hung up on technologies. You know, that's what the industry groups have to figure out.

The process for mapping really comes down to starting off with generic -- system functions. Identifying which of those are demand response related for some of our initial work. Take into account tariffs, the policy, other constraints. Come up with a minimum set of requirements that, you know, involves things like defining future proofing, you know, issues, ability to evolve and the like. And translate that through a process into this reference design consisting of objects, interface and the transactions.

Once we have a reference design, then the investor-owneds and others can produce the functional specifications that meet their local needs; maybe go into more detail, define

communication flows, user interfaces, other things that are specific to their implementation, their specific needs.

Vendors respond with design specifications for the equipment necessary to do that. And then, you know, implement them in the field.

So just to review, you know, we have this premise. Demand response will become a major resource of California's future electricity problems. And advanced metering infrastructure will be deployed on a large scale throughout the state.

Price signals will be used to induce load response. And technology will act as a proxy for end users. In other words, respond signals and take actions.

So we have this premise. If the premise is true, information exchange will be required between several organizations and systems, numerous applications that create and consume information, you know, will exist.

This leads us to the conclusion that for there to be a seamless exchange of information in ways that we can't fully define today, there's got

to be a common reference design for California's demand response infrastructure.

So that is a very short version of this report. And we're not going to do any questions now. We'll do those a little bit later on.

Okay.

MR. MESSENGER: Can I just -- you said no questions, but there's a couple of words that you used that I don't think, let's call it the lay person, I'll represent the lay person, understands.

MR. GUNTHER: Go for it.

MR. MESSENGER: One of them is objects. That seems to me that's a computer language term that you probably need to define. And the other one is transactions, which, as an economist I have a certain perspective on, and I think you have a different one.

MR. GUNTHER: Okay, an object is any, you know, anything, you know, a thermostat is an object. It has certain properties, you know, like it has a set point and you can read a temperature from it. So that's an object -- as an object.

And there is interface to that device, a way to get that information into and out of it.

So that's the simple definition of object. Anything that has an attribute that you can get and set information.

Transaction is basically the mechanism that's used to get information to and from, you know, some device in a way that can be controlled or managed in some way. So a transaction may be a way to insure that the information got from point A to point B. You can audit the fact that it was received, acknowledged, and you're sure that the other person has. That's one example of a transaction.

Lots of definitions of transactions, but basically, you know, to the actual mechanics, standards associated with moving that packet of information from point A to point B and verifying that it got there.

Got a couple of those out of the way. Yeah, it's easy to get, you know, bogged down in the language. The language of information technology is quite a bit different than power system world which sometimes makes things a little challenging.

Okay, what we'd like to do here next is move on to hearing from several representatives of

industry who have been working on a variety of facets of architecture and other technologies that can, you know, be used to implement the concept of the reference design, and get to the implementation.

And the first person that we're going to have talking to us today in this regard is Rik Drummond. Rik is the Chief Executive Officer and Chief Scientist for Drummond Group. Rik Drummond has led the company's technical and research strategies while steering DGI to constant growth in innovation. He's a widely respected authority in the ebusiness industry. He's been a driving force in the technical standards bodies and vertical industry groups, supporting -- commerce.

Rik has also been instrumental in the development of XML, EDI, EDI over the internet, and electronic messaging. Basically before cofounding Drummond Group, Rik helped drive adoption for internet enabled secure messaging working for a variety of clients in this phase, including (inaudible) contractors at the Digital Equipment Corporation.

Rik currently serves as the Chairman of 13 on the GridWise Architecture Council. The

Council is a (inaudible) energy task group focused on defining the next generation of information systems for the national electrical generation and distribution power grids. Rik.

MR. DRUMMOND: Thank you, Erich. Well, Erich's given me like ten minutes today, so I will not talk in my southern drawl to y'all.

(Laughter.)

MR. DRUMMOND: I will talk in my east coast to you ladies and gentlemen. So where's the industry going, and this is the level of stuff to kind of show what we're thinking of in the GridWise Architecture Council. And we'll get into where we're going, our mission and some of those sort of things over the next ten minutes.

There's different interacting thanks to utility restructuring. And we have to do that because the industry, as you know, has very aged infrastructures out there right now.

Notice the word markets. Bidirectional power and monetary flow. Open door to other distributed resources. We're talking about (inaudible) resources, planning for that, which has been talked about for some time, kind of like the meters from 25 years ago.

I was actually offered a job in 1981 to a rural electric utility who wanted to put in automatic meter reading. And I'm just so surprised it hasn't happened yet. I'm kind of like one of our speakers this morning.

Ubiquitous communications. This is the key to making supply chains more effective. And it's not passing the analyzed data back and forth; it's passing the raw data back and forth, so you will not get whiplash and those sort of things happen, the planning cycles. Real time seeing what's going on and monitoring.

And, of course, that's very IT oriented, information technology oriented. And collaborative control and operations, diagnostics, market operations and monitoring, security and privacy. And also moving the business transactions back and forth in a very efficient manner.

So this is kind of a feel for where things are going. And you all probably know this better than I, since I'm an IT professional person, a power engineer. Which I'm reminded about very frequently on the GridWise Architecture Council.

(Laughter.)

MR. DRUMMOND: So what are the GridWise Architecture Council's mission and goals. The mission is to establish raw industry consensus. Because of this we have to bring in all the different industry segments to put together the common vision of how to tie their segments into the overall grid, itself, so we can move information across in a consistent manner. And also have the ability to monitor things and control things across segments as necessary.

Support of the technology principles that enable vast scale inter-operability. One of the reasons I'm in the GridWise Architecture Council is because what my company does and my expertise is large scale inter-operability, testing of products. Necessary to transform electric power operations into a system that integrates markets. So we're talking about technology; we're talking about markets.

To insure our social economic well being and security, which is what regulation is for. To insure that marketplaces and the technology and businesses conform to the social good.

So, of course, we have these technology

effectors. And I'm not sure this is the perfect representation of this because, you know, these things are all intertwined. It's not going in a circle.

Technology affects business principles and how you make it pay appropriate profit. Technology either drives markets or makes new markets. Or markets drive technology to help them do things better.

Regulation, of course, comes to play when you need to control markets, control business, because they're going outside what we consider to be the social norms, or economic norms.

So these all interplay. And if we're going to address the issues in an inter-operable grid we have to at least know the issues in the market areas, the business areas and the regulation areas.

So as we do our constitution, which I'll talk about here more in a minute for the -- I should say repose constitution for the North American grid, even though our focus is on technology and inter-operability for monitoring control, we'll have to address, at least know

where the issues are in regulation, business and markets.

Our goal is to find a Pelling tentacle vision and clear values toward that engenders direct cross-industry -- in action. We'll be doing an interview in our constitutional process starting fairly quickly. And if anyone would like to be interviewed let us know.

If I would kind of say this in a very simplistic term, we would like to see some sort -- something out there which will maintain a common vision, maintain inter-operability across this very large machine in the United States over a 30-year life cycle.

And since none of us can predict, especially the internet, more than about 18 months out, it means humans have to be sitting and govern this thing over time somehow. And that would be an industry governor sort of work, which is what we're kind of looking at going. This is not the GridWise Architecture Council, this is another thing which would govern that thing in the future, is kind of our vision. And that's a vision versus a fact at the moment.

The key part of that is buying across

industry segments. It's about ownership; it's about getting the knowledge from different people and different organizations so we can actually focus on what the key things are and that sort of thing to put this thing in place. We'll be working that over the next six months.

Establish a flexible inter-operability framework from large-scale integration of intelligent equipment and human interactions. I live in inter-operability. And what Erich's talking about with respect to his reference design, and he's talked about inter-operability part of that, you have to design how you do that in the design, itself, to make sure it's cost effective. And I'm glad to see he's doing that as part of this whole thing.

And I'll skip the rest because you probably read that already. The bottom one, though, is really interesting in that if you would look at most colleges out there, there's a severe dearth of power engineers. So who's going to design this net generation power system, because there's not many people in school doing this right now.

So some of you who out there will be

retiring in the next five years may have very lucrative utility contracts going on for years.

(Laughter.)

MR. DRUMMOND: What is the knowledge base of the Architecture Council. And I put this up not so much because the name -- stars, but because of the internal circle. We have information technologies on communication expertise. Many of this is like 25, 30 years worth.

Markets trading economic expertise. Industry system controls. Electric energy, generation, transmission, distribution. Commercial and residential buildings.

So we have a pretty wide view of what needs to go out there. We have customers, we have distribution, we have transmission, we have generation. And I'm sure we're missing some, but you can only get so many people to work together in a committee or council.

So what is the grid's constitution, what are we talking about here? Well, the story of this is I was in a meeting with Erich and I guess -- who else was there, Erich?

MR. GUNTHER: Stephanie --

MR. DRUMMOND: Stephanie was there. Last year we were all talking about doing an architecture for the grid. And, you know, what we heard this morning, when you say a word everyone has a different perception of the word.

And I bet for 30 minutes we talked around the word architecture, and there were like 25 people in the room, and we probably had 24 different definitions of architecture.

So I popped up and said let's just do a constitution for the grid. And everybody goes, yeah, that makes sense to us.

Now, when we say that, our kind of operative perception of this thing is U.S. Constitution, Governor's Body, Representation, all of those sort of things, Bill of Rights. And that's kind of where we're going, even though we don't know what it looks like yet.

But we do know how to put it in place, which is through vision, asking questions of people, some sort of governors board has to happen long range to maintain this thing through the next 30, 40 or 50 years.

So, we're doing that with the constitution. We're also identifying the state of

the art and best practices and standards. One of the reasons we're here is because we would like to have transfer as part of our vendor-neutral, association-neutral, industry-neutral view of the grid best practices.

And obviously what you all are doing here makes a lot of sense. And I know it's already going to other states and that sort of thing already. But we'd like to help do that, also, as our kind of our practice in ongoing endeavor.

And initiate ongoing activities, liaisons and collaborations, we will not do these really formally because we want to be neutral. But we would love to share information and I guess the best way to say it, be friends and family and do what's best for the grid. And initiate state activities.

When our constitution starts off formally in May we'll be doing a lot of internal work on test interviews and that sort of thing for the next two, three months. And you start invisible in May, we'll start the next generation of technical activities, which will be visible about six months after that.

Now, remember, this is a volunteer organization, and no one gets paid for it, so we move kind of slow sometimes.

So here are the key points of the constitution. It's key we develop wide-scale buy-in and wide-scale vision. Work heavily in the auto industry for supply chains. The health care industry, health care reminds me of this. We are a federation of states. The federal government can only push so hard, and the states have a lot to say in what happens.

So, things cannot be mandated down to the letter, unlike some nations. And you must get buy-in, you must get consensus, you must get a common vision across the states, municipalities, those sort of things. And that's why our focus is so strongly on that versus what the DOE or those sort of people said. It has to be from the bottom up and top down to put these organizations together.

So what's the difference between reference, implementation, platforms, inter-operability. I just threw this in here since I do a lot of inter-operability stuff.

You look at it, a reference platform, I

should say a reference design lays out what things look like with respect to the requirements, which -- regulations. Which hopefully were somehow metered against business requirements and those sort of things.

Below that usually have reference implementations which try to implement that reference design document and vendors do those normally. Not necessarily. Schools can do them, those sort of things.

Below that you usually have a reference testing system which helps you verify that the reference implementations actually meet the reference design.

And then below that you have reference, you actually do inter-operability on the reference implementation to make sure they actually talk. And that can be a cross-transaction level, database level, communication level, protocol level, different layers.

So my key point here is we all grew up in mathematics thinking that if things -- that A plus B is equal to B plus A. A is B added together, followed by C, is the same as A added to B plus C. Different orders. Right?

Guess what? Inter-operability is not associative; it's not communitative; it's not transitive, because A can operate with B and C can operate with -- I should say B can operate with C does not mean A can talk to C.

So all of the rules we think about logic-wise do not apply to inter-operability. So when you look at a reference platform, which would be your implementation out here, it gets you about 95 percent of the way there for inter-operability, and the last 5 percent only happens one way. You got to demonstrate it.

So in closing, GridWise Architecture Council, and we changed our name from Architecture Board because we thought that it sounded like it was too controlling, is neutral volunteer organization sponsored by the USDOE to facilitate the next generation grid through a collaborative vision setting process across all industry segments of the North American grid.

GridWise Architecture Council's first visible effort is the interview process to implement a common vision across all stakeholders and form an industry controlled governance body based on a grid constitution.

And the final one is inter-operability and performance are not the same. And we need to make sure that we factor both of those into your final reference design.

Thank you very much.

MR. GUNTHER: Thanks, Rik. All right, next we're going to have some additional insights from a different industry perspective. This time from the electric utility side of things.

Our next presenter is Wade Malcolm. Wade is currently the Vice President of Power Delivery and Markets for the Electric Power Research Institute. EPRI is widely considered the science and technology consortium for the global electric industry.

Most recently he was President and Chief Executive Officer of EPRI Worldwide Holdings, a wholly owned subsidiary of EPRI, serving as the international business development arm of EPRI. EPRI Worldwide serves 62 members and more than 1300 funders.

Wade holds a BSEE and MSEE from Drexel University. He's a registered professional engineer, and a senior member of the IEEE.

MR. MALCOLM: Thanks, Erich. I also

want to say thanks for the opportunity to participate. There's a lot of familiar faces in the room, so it's good to see many of you again.

So I have a unique opportunity to talk about something that there's probably a dozen people in the room that know it infinitely better than I do, because they actually did the work behind these activities. But I'll try to do them justice in the process.

I'd like to brief you a little bit on an activity that we have underway called the IntelliGrid Consortium. And also it's relevant in terms of the efforts to come up with a reference design.

I think it was mentioned earlier that a lot of the work that needs to be done to establish a reference document has been done. And so then the question is what to pull together, how to pull it together. And IntelliGrid represents an opportunity, as well as a source, to draw from. And then also, in return, to hopefully share the result of this activity back to the IntelliGrid Consortium and grow that product, as well.

The IntelliGrid Consortium has, I think, in many ways some very similar roots to what we

just heard about in GridWise. There's a desire to accelerate and transform the power delivery infrastructure.

And as we look at technologies that customers use, and how they evolved, we see that they impose new needs on the grid, itself. And that requirements change over time with different end-use loads. And so the intent was to look at what needed to be done to actually effect a transformation to support what these future directions were for customers.

And IntelliGrid is a public/private partnership. In the past the Commission, as well as DOE, have been active participants and continue to participate. We've had a variety of companies that developed various technologies, both in the information technology world, as well as the utilities that are active participants and sponsors. Very strong participation from the utilities.

And then we interact with a variety of vendors and, again, manufactures and developers in the process.

And so it's meant to really be something to transcend one industry segment, and tries to

get a variety of views to focus on a common solution.

And I'd mention in that context, just in the discussions of GridWise and IntelliGrid, I know that both organizations have had an opportunity to interact in the past. I think there's a tremendous opportunity to perhaps increase our interactions going forward. Many of the goals and objectives sound very similar. So we look forward to an opportunity to try to better integrate our efforts.

There's been a variety of work products that have come out of EPRI's initially called SEEDS, under the Electricity Innovation Institute, and now called IntelliGrid, as part of EPRI, with a variety of changes that have gone on. The products that have been developed, they think, too, are particularly of note and are relevant to this meeting.

One is the development of what's called the IntelliGrid architecture. And I think Rik is very accurate in identifying there's, you know, architecture, sounds like a fairly concrete term. But I think that if we just did a roundtable you'd probably get a couple dozen, at least a couple

dozen different interpretations of this.

And then similar process, there was an effort to establish the vision of the future energy system, a process that engaged stakeholders that really refine a vision to make sure we had a common view of what this system of the future looked like.

And then start to define requirements for this future system. And then analyze those requirements. And then publish those initial results. Start to build methods and tools to support this architecture. And again, how it can be used to transform the existing grid.

One concept is if you can start doing small conventional products that can support this architecture, the utilities could develop what's been called a no-regrets or perhaps it's a more robust strategy for the future that would allow some of these other capabilities, much like we're here talking about for demand response to actually happen, as well.

The results of the IntelliGrid architecture activity and the documents, themselves, are in the public domain. They're available for download at the website that's

listed in this presentation.

And I think I need to mention, in terms of EPRI's perspective, this is really not the first attempt or the first activity we've been involved in in this regard. This is something that EPRI's been funding development of with its industry partners for nearly 20 years.

And we've been able to develop architectures, sponsor development of protocols and also support through technical development a variety of international standards that have been progressed and used today in the industry.

So we think that there's an opportunity to apply the IntelliGrid architecture in some of the activities going on today. It's been used as part of reference material to start to build the drafts that you're considering. And I think it continues to be a resource in that process.

The initial project, if you will, develops a very high level architecture, kind of building codes, if you will. And the hope is through activities like this and others that we have underway, is to work with other stakeholders in the industry to develop specific designs; look to possibly implement what I would call maybe an

analogy to an open source model where we can get case studies compiled; again, bring results together.

And rather than unilaterally try to implement this, try to cooperatively build out this architecture as we go forward.

And a second project underway now, funding in earnest this year, is the development of a consumer portal. And I have to say that when I first heard about the consumer portal it made me think about how our industry has changed; but maybe in many ways some aspects of it continue to stay the same.

This isn't a new concept by any means. There's a variety of designs and iterations that have been attempted in the past. And I think there's been a lot of lessons learned from it. Out of that we have a very robust conceptual design we're working on. We think this is an ideal place to interact in terms of demand response, as it becomes a subset of activities that the portal would need to be able to integrate with.

As such there's some high-level elements of the portal work that look like a natural fit,

at least as a resource or a reference material, in developing ultimately what would be the work product that comes out of this workshop.

We also want to stay closely involved because as that work is developed we want to be sure that we can incorporate it into our consumer portal activity, as well.

I think there's probably quite a lot of things to talk about, but rather than anticipate and make the presentation, I'll contribute a few minutes to try to get us back on track so we have time for discussion.

But, again, I think that I'm really encourages that first of all, being able to participate, have this kind of a turnout, get to interact with other organizations that have similar interests. And we hope that we can work with you as we go forward to make sure that our work results can contribute to a better quality outcome.

Thanks. There's a variety of other slides online that just support material. Thanks.

MR. GUNTHER: Thank you, Wade. Okay, next we are going to hear from Ray Bell. Ray is, if I get the right thing queued up here, Ray

brings over 24 years of innovation, product development, marketing, sales and management experience in the software and networking industries to SilverSpring Networks.

Prior to joining SilverSpring Networks Ray was an entrepreneur in residence with Foundation Capital. Previous positions include Founder, CEO and CTO of SmartPipes, now known as EnForce; Senior Director of Engineering at Cisco Systems; and Senior Product Development Sales and Management positions at Oracle Corporation. Before joining Oracle, Ray was the COO of CP Software, an information management software company.

Ray.

MR. BELL: Well, thank you for inviting me to speak today. Unlike a lot of people, I've been involved in the utility industry for just one year. So a lot of you have been 20 years, 25 years. But a lot of my career has been involved in advanced data networking, advanced data systems. And what's probably on point is the work that I was involved with in helping the telephone industry in building products and technologies as they moved from switch networks to packet

networks, involved the cable industries as they went from analog to digital, streaming video, involved with the data processing industry as they went into the internet from client server technologies.

What fascinated me about this opportunity is the utility industry, in my opinion, is about ready to go into the same transformation.

What's been talked about today is AMI or demand response. And one of the underlying tenets of that is a demand response infrastructure. You know, I talked to a few of the utilities and asked them a question: When was the last time you had the opportunity to go out and replace every meter in your service territory.

And, you know, it's a compelling question, because not very often; in fact, I don't think anyone's done it. And here we're talking about going out and putting out, over a period of time, up to 11 million digital meters into this, what will become one of the larger networks ever built.

And whether it's a network that just collects information or supports information flow

between systems, you need to look at that and start to ask yourself, what are the core set of requirements that are necessary to do this.

And so we started talking to the Energy Commission and we started talking to the customers around what was going on with AMI. And everyone kept saying reference design, reference design. What are we going to do.

And we said, you know, what made sense to us was if you look at the actual, the customers' requirements and you get a set of industry people together, then those industry people can work with the customers and actually build designs that meet those customers' requirements and provide a foundation to move forward.

So, OpenAMI is really about that. It's not a consortium, it's not a standards body, it's a task force. It's a task force of interested participants, whether they be vendors, utilities, regulators, customers, end customers, who are somehow affected by what's going on in this state.

And so if we start with the utility we look at what's important to them. And the importance to them is to insure reliable delivery

of energy services at a fair and equitable price, and empower customers to make smart choices.

From a regulatory perspective, what we want to insure is that this infrastructure will not be quickly obsolesced, that technology evolves. When we set out to build the internet we didn't have all the technology defined, but we didn't wait for that to happen because if you don't start today tomorrow will never come.

So we got started; we started to build reference designs; we started to build technologies. And we built an evolving network which, today, pretty much controls the way our society works as an information society.

So what's required? We talk a lot about reference designs, we talk a lot about technologies, we talk a lot about products. I think what we're all trying to struggle with is what is a common definition which will define what we're about to embark on.

If you think about the work that IntelliGrid and GridWise are doing, they're looking at a very broad next generation utility grid.

What OpenAMI is talking about is what's

the underlying advanced metering infrastructure to support demand response. It's a very much smaller contained view. We used to have a saying at Cisco, "we're not trying to boil the ocean here, we're trying to get really focused in." You need a core set of requirements and come up with a rapid suggested reference design that AMI networks and demand response systems could adhere to.

This is not about creating yet new technology. It's about leveraging all the work that's gone on in the last two to three years in the statewide pricing pilots. A lot of good work has happened. A lot of solid requirements have been developed.

Ontario Energy Board just went through a similar process and have a whole smart meter proposal which is now on their website and posted. There's work going on in Australia in a common vein. And as Joe mentioned, there's many many other states with common interests.

So it's not about recreating the wheel. It's about trying to take these existing technologies and standards, crystallizing them into a concise plan that the utilities can say, you know what, they can go back to their vendor

and say I'm looking for a product that meets these requirements.

And they can build a business plan on that; present that to the regulators; and they can say, yes, that meets our requirements. Right, which is an open, extensible system that we can evolve over time. This isn't the big bang theory.

What's it mean for customers? I won't read all these slides, but for the utility basically it gives them freedom to get started today and evolve a network as technology evolves over the next five to ten years. There's not one product today that's going to meet all their requirements. But what's important is that we have a blueprint where these products can evolve into.

What's important to the vendors? Well, we build products, right. I build networking products, we're building networking products for the utility industry. So we want to know what those requirements are; we want to build great products; we want these products to inter-operate with our competitors because we believe in a heterogeneous network, because that will grow a market versus a proprietary network.

The task force, again it's purpose is really to do rapid development of a recommended reference design. A reference design, we talked a lot about what that is. We talked about information data exchange. We've talked about inter-operability. We've talked about architecture. They're all important. But what's really important is that we focus on the project at hand, which is focusing around how do we design an advanced metering infrastructure that can actually support demand response, not only in this state, but in other states and other countries.

We came up under the utility communication architecture international user group. We're a task force. My experience in the past has to been to actually get customers engaged, to get the customer to act as the overall governance, provide the governance to the industry, where they can actually help guide and shape these.

Ed Fong, he's in the crowd, has offered to join that. You know, this is a call, really, to action to all the other utilities to get involved. GE and ourselves have agreed to be facilitators. Being a coChair means a lot of

extra work besides your day job. Anne-Lise is in the back and has agreed to be the secretary. She is currently the program manager or project manager for IntelliGrid's consumer portal.

And underneath are three areas that the group's going to focus on. The first one is taking all of these requirements that have been developed over the past few years by the state and their programs. Reaching out to other utilities and other initiatives and grabbing those requirements, pulling them together.

And once we had a common set of requirements, to actually then start to do computer science stuff, which is data modeling. Because without an actual, you know, data model it's hard to go to a design.

And there are specifics. I'm not going to get into them here, but I'll invite you to come get involved and work on those. And I think, as some of the other speakers said, without inter-operability it doesn't mean anything. Right. There's a reason cable modems are $35. Because each one has been certified by a nonprofit inter-operability lab to work. And the customer, the MSO, can actually go down and buy it, certify that

modem; you can plug it in and it works.

We've been told this schedule is not aggressive enough. I think it's very aggressive. But we had an organizational meeting down in DistribuTech last week already. There was, I think, about 70 people in attendance. The website has been up for two weeks. We've had over 25,000 hits on the website.

The membership's growing. We have a list of some of the members behind it. And tomorrow is our first working group session here in Sacramento where we're actually going to dig into the requirements, spend a full day starting to outline those, get those together, get focus on it, and then aggressively move forward to March where we have a deliverable, which is the first requirements draft spec.

Tomorrow's meeting is in the auditorium at 744 P Street. I understand it's right across the street here. It's in building 9. And the meeting is from 9:00 to 4:00. So we thank the state for letting us use a building. We're a fledgling group with no funding. But we welcome you all to come and join in and help with the work.

Membership is open to anyone, individuals, organizations. Who shared this vision? While membership in the UCA users group is encouraged, it's not required. So the website is OpenAMI.org. You can go there and join, get involved and help us deliver a set of requirements we think that the customers are really looking for, and which will help meet the regulators' requirements as we go forward with trying to roll out an AMI in the state.

Thank you.

MR. GUNTHER: Thanks, appreciate that. Okay, moving right along to our fourth panelist's presentation. We're going to hear from Richard Schomberg. Richard Schomberg is the VP of Research and new technologies at EDF, International.

Since earning his master of sciences degree, and I'm going to try to do the French here, Ecole Superiore de Electricite -- I can't speak French -- he has been holding many management positions for 25 years at EDF R&D.

In 1980 he created a startup company designing microcomputer software distributed for the first time in French book stores, which earned

$6 million over 18 months.

He has been a professor of systems engineering at Ecole Superiore de Electricite for six years. And was recently elected President of the International ElectroTechnical Commission, a worldwide standards-making organization.

Today he represents EDF R&D in North America, and specifically in the steering committee of IntelliGrid. Richard.

MR. SCHOMBERG: Thank you, Erich. Ecole Superiore de Electricite -- well, it was well pronounced, thank you.

(Laughter.)

MR. SCHOMBERG: I'm very happy to be here today because I think it's a real opportunity for EDF to be able to exchange, communicate and participate in some way the effort that is ongoing here. And I will explain to you why.

First, just a few seconds, well, the EDF group is a large energy utility which is doing business in about 26 countries, but it's mainly in Europe. And, of course, mainly in France and around France, which where while we are first in France, we are second in the U.K., third in Italy and fourth in Germany. We are dealing with about

14 million customers.

The interesting thing here is to see the deregulation process in Europe. So in France we need still to go under deregulation of the residential market, will be in 2007. And that's a major, it's a major step that we have to go through. Because for now EDF is an integrated, vertically integrated company; and we've been like this since 1946. So it's a major change, a major turn that we have to overcome.

So -- power in the European market, definitely the re-regulation which means that we don't try to compete, keeping all the market shares, but we have to compete to be able to get new market shares outside. Because, of course, you cannot fight against the market, and you have to lose market shares.

And also what's very new for us is that being vertically integrated, many many problems are dealt with by themselves, within the company. You don't even realize that there are some issues and a lot of information going back and forth.

And as soon as you start to reorganize a company and you start to break out the value chain, then you discover an incredible complexity.

And that's really -- and then you install new players, and you need also to give data access to all those new players.

And the French regulator already has been ruling and requesting standard communication in whatever we're going to do.

And last, not the least, there is a European directive about energy savings. We have to save 1 more percent of energy each year until 2015. And actually there is a margin of maybe 20 percent of savings that can be performed on buildings and maybe 10 to 15 percent in industry and in transport. But it's a huge effort.

And everyone will have to comply to this. And we have a special market tool which is called, well, -- certificate. I'm not going over this concept here, but just tell you that we have to do something.

EDF metering today is being, let's say, 10 million meters that are allowing demand response and we've been doing that for many many years, because we've been choosing to be highly nuclear. We are 80 percent nuclear. And that means that we need to shape the load curve because we are -- based. And we've been deploying demand

response devices -- metromechanical meters that we're allowed to meet demand response.

And, of course, we are replacing those equipment progressively. We buy one million electronic meters a year. And those electronic meters allow us actually to, well, do, of course, -- meter reading. And on the residential meter, which is the upper right here, we can download and modify parameters that on industrial meters, which are the three down on the slide, on those you can actually completely reprogram the meter. And you can download remotely, and the new software, and it's a completely new meter.

And that's really a key. That's really a key because that's how we've been able to decide to make an investment. Because we know that we will be able to adapt whatever we have in place.

And, of course, today those meters are in the range of $1000. This one is much much cheaper. Not going to tell any price here.

But we developed a reference design for each category of meter, residential, commercial, industrial. Our reference design is, I would say, maybe too specific regarding what we tried to achieve here, because we could also include

specification that we used in the RSPs.

But the good thing is that it works because you see those three meters are three meters developed by three different manufacturers on our specification. And it works perfectly.

Now, another key issue which I don't think we really mentioned that today, is the information system that you need to have in place to cope with all those meters.

And, of course, those meters, it's already a huge issue, but it's nothing, it's just the tip of the iceberg. And, of course, as the Energy Secretary said, we need to come down to data, price and control signals, which is right. That's only this.

Actually we have to work across the old value chain, including business models and how the companies are organized, and who are the players and what access must have the right and duties of each player to be able to define those, well, simple piece of information. But that's old story.

The problem is not the meter. It's really at the end in what we'll discover in working jointly, well, the reference design of the

meter, but also on the information system.

And EDF is preparing aggressively the 2007 100 percent opening of the market in France. And, of course, we have to develop new services and energy savings services and features. And that's really a huge work, huge marketing and organizational work that we are doing within the company. And we work on technology, on the meter that we use just internet as communication media. And coping with all the security issues, of course.

And, well, that's just, I would say, an assessment, because we do not develop technology. Well, EDF has been, for a very very long time, highly technical and everything we were doing was golden plated. But it's no more this now. We will be a utility, a business utility, as all the others.

So, we are still working on this. But, of course, we need to move forward on the new reference design at the appropriate level, embedding, of course, benefitting from all the experience we have, but also the experience that we can find around the world.

And definitely we are betting on the

improved capabilities of remotely being able to reconfigure the meters. For us it's really an investment and a decision key.

Now, the conclusion. Well, if we can dream it, we can do it. That's General Motors, I'm quoting. That's a take-away from a visit at Epcot.

(Laughter.)

MR. SCHOMBERG: But I like it very much because I have the feeling that we start dreaming, so what is missing to do it. Well, definitely the U.S. experience of competitive market is huge. And speaking for EDF, well, we are just discovering this. And we have a lot, a lot, a lot to learn on this.

And what we can offer is experience on standards. And, of course, it was easy for us as being vertically integrated. I think we had a unique advantage to develop this. But definitely, can we do it if we can dream it. Well, energy markets need critical mass of enabling technology. And what is important in this sentence, it's not enabling technology, it's critical mass. (inaudible). And even I would say there's too many, there's too many technology. And there are

too many -- well, it's too fragmented. The efforts are too fragmented.

And this is why I'm so glad to be here today because I have the feeling that it's the very first time that are sitting in the room representative of all type of players.

And critical mass, how we going to have this? Well, critical mass, I'm sure that there is a kind of threshold effect, you see. You can bring much much more equipment, whatever you want, but there is a threshold. And as soon as we will be over the threshold, then everything will happen very quickly.

While I cannot say where is that threshold, I'm sure that type of mechanism there. And definitely for EDF, well, deregulation is a fantastic offer, fantastic business opportunities, because we have to do it. We don't have any choice. And we have also to make energy savings. So we will have to invest and deploy systems. So definitely we want that those systems will not be more expensive if we try to have them doing more.

And, of course, we hope that we will get much much more benefits from those enabling programmable meters as we will be able, also, to

bring new energy savings.

Thank you for your attention.

MR. GUNTHER: Thank you, Richard, appreciate that perspective on where we're heading here.

Okay, what we'd like to do next is we have, you know, two discussants, two people we'd like to provide some of their off-the-cuff, if you will, observations on what they've heard from the panelists, you know, so far.

So I'd like to get, you know, some brief remarks from Terry Mohn and Dave Cohen. So we'll start off with Terry. I'd like each of you, when we get to each of you, to, you know, just do your own introduction briefly. And just give us your observations on what you've heard, you know, so far, and the panelists, if you've got a question for the panel, you know, feel free to do that. We'll just take five minutes or so for each of you before we open it up for some open questions.

So, Terry.

MR. MOHN: I'm Terry Mohn with Sempra Energy, SDG&E. I'm a System Architect with the utility.

I was very eager to hear the

presentations today. And I recognize that we're surrounded by some very noteworthy individuals.

Some of the remarks made I did capture. They inspired some questions. And so I don't know the best way to approach this, but I have a number of questions for some of the presenters.

What I'd like to first comment on is Mr. Gunther's proposal for reference design. He brought up a couple points that I thought were very important. One was the definition for guiding principles and a framework in which all pieces of technology can interoperate.

We have found, over time, that we inevitably invest heavily in technology that the term used was we strand assets. The question is well, what does that really mean to a utility. And for us that means that we've invested heavily in this infrastructure that we may one day not be able to replace as quickly as technology evolves.

And we end up nurturing that particular implementation along until it no longer can take even a gasping breath.

And so having a framework in which technologies can move in and out of is very important to us. So I see that the reference

design, the concept of reference design is absolutely critical to success of using technologies in the future, because we all want to continue investing in single technologies that inevitably have to be replaced.

So, I'm in full support of the reference design concept, particularly having to do with guiding principles that define a framework.

With Mr. Drummond's comments on the GridWise work, I'm really impressed with the talent that they've been able to bring together to orchestrate a plan for how to modernize the energy grid. Each one of those individuals, I'm sure, is a luminary in their field. And Mr. Drummond is certainly one of those.

He brought -- Mr. Drummond brought some really interesting concepts on how they want to move the activity forward. And actually it turned out to me, as I was thinking through one of the projects, the constitutional project, a question came to me as how to discern or differentiate the constitution from the charter that actually created the GridWise Architectural Board.

I wonder if you might be able to just explain that a little bit, because I'm a little

bit confused. The difference between a constitution and your charter.

MR. DRUMMOND: Okay. Our charter is specific to our group. And it talks about our function and what we should accomplish within the group.

What we believe needs to happen is, and we will know this more after we talk to lots of you, that we might want to have a super group of what we do, or a whole new group which would actually be more of a governance board. And the constitution, in essence, forms its charter. Not our charter.

So, we're looking at launching one which would be able to handle, as I said in my presentation, the market issues, the regulatory issues, technology issues, and whatever the fourth one was.

(Electronic noise.)

MR. DRUMMOND: That's not me, is it?

(Laughter.)

MR. DRUMMOND: So, our charter's in place, but we're looking at doing a group above that possibly which has even broader industry representation. We have quite a bit.

Our charter is not for -- I mean I don't know what the life of our group is, actually. I don't think the word ad hoc is exactly the right word, but it very possibly has a limited life. While the group we're talking about has a life of years and years and years because, you know, as we know, we installed stuff back in the '60s which is still in the network today. And was supposed to have a life of 20 years. And now it's into 40 years.

And the same thing will happen next time, too. So we need something which governs this thing and keeps it together and keeps the people together and vision together, which is much broader than what our charter is right now for the GridWise Architecture Council.

And whatever this constitution ends up forming, the presidency or the congress or whatever it's going to be, it's going to have its own charter somehow, as we work that through all the people to help form that.

MR. MOHN: Thank you. Mr. Bell's presentation on OpenAMI couldn't come at a better time. As we talk about technology choices, it becomes daunting to try to figure out how to marry

those technologies.

And OpenAMI is an opportunity to look at how those interfaces, as you were describing, can open up the flow of information between dissimilar technologies, and even dissimilar vendors.

And the motives for vendors are driven primarily from profit. So how do we encourage adoption of this type of, this paradigm, this OpenAMI. We're hoping that beyond just the vendor participation that you, as you're developing your specifications, that you have a broad scale involvement from the utility partners. And I'm wondering how you're going to encourage that sort of participation.

MR. BELL: Thanks, Terry. We really pulled this task force together in the last three to four weeks. So this is relatively quickly. It was a series of meetings that we had up here in the state in December. And so it's really been in existence, I'd say, formally, for a week and a half up to two weeks.

So, I think from the rapid kind of interest that it's garnered that's a good start. But it's really a call to action out to the customers. And so we have more people are

joining; we're reaching out; we're trying to touch more and more customers and say, look, we need you guys to get involved with us.

The industry participants are very interested in, you know, promoting inter-operable products. And the reason why is if you, you know, history has proven, if you have a closed solution you can build a small market. And if you really open up and have inter-operability products you can build large markets. And so from a vendor's perspective, as John Chambers used to say, just want your fair share of that market.

Kidding aside, you know, standards do drive that, it's proven to drive that. The key, I think, as you said and we've talked about in the past, is it's about existing requirements, existing standards, not recreating things. And it's taking those existing technologies against those well known requirements that everyone in this room has worked on, I know, for the last few years, and other industries. And EDF, I'm anxious to find out more about that. And kind of shaped those together.

And so how we'll go about doing it, it's just, it's really reaching out to the customers,

themselves, and inviting them to get involved. I think we had a good start down at DistribuTech last week. And I'll just ask each and every one of you here to, you know, let's do the one degree of separation, and I'm sure we'll have a lot of people quickly.

MR. MOHN: Very good, thank you. My last remark is to Mr. Malcolm The work that EPRI has done on the IntelliGrid has been very well received. Our organization is very excited about the direction that it's going.

I'm a member of three of the PAGs, public advisory groups. And I just really appreciate the direction that it's going in the sense that you're embracing wholesale adoption across an entire swath of the industry and you're not focusing strictly on what are the concerns of the electric industry. You're looking at the technology players, as well.

And so the synergy that may occur between IntelliGrid and GridWise is so apparent. And now to have this even crystallize even further to a more finer detail, using OpenAMI as an example of using one of the outputs of IntelliGrid is really comforting. So I really like the work

that the IntelliGrid project is bringing about.

MR. MALCOLM: I just want to thank you for your guidance and insight along the way. And also we hope to be able to support OpenAMI as it grows. So.

MR. MOHN: That's it.

MR. GUNTHER: Okay, thank you, Terry. Next, Dave Cohen, why don't you give a brief introduction and ask away.

MR. COHEN: Yes, I've already been introduced. I'm Dave Cohen from -- the CTO of Infotility. And I'm part of this GridWise Architecture Council, and I support very strongly the IntelliGrid, OpenAMI, all these.

I think the critical thing is going to be how to get the vendors to look at all these different initiatives and take us all seriously as a single entity and not point us out and say we're all different and not pay attention to us.

And right now we're currently developing software framework to automate a lot of DER-type communications and control. And we've done some demonstration projects. We would love to have a framework like what's being proposed, and that's why I'm involved with these. If it was in place I

think a lot of vendors would say, yeah, it really makes sense, bottomline let's use it and let's move on. I mean at the lowest level.

I put together a couple of my take on the value proposition. And I think, from my perspective, what we're talking about here is that when we talk about large-scale integration as where this stuff becomes really significant.

Everyone in this room knows and can point out a demonstration project here or there where there was a small-scale demonstration. When you get large scale, you look at some different things. And these may be redundant with things that have been said, but these are my real important key value points. Because I think we've got to get the value proposition out to everybody else. We're speaking to the choir with us here.

But this idea of plug and play, everybody talks about it. When you think about the critical grid infrastructure, you cannot afford to take the grid and reboot it when you need to plug something else in. So whether or not, you know, it's a meter or a gateway or whatever that's controlling something, plug and play is not like in a phone business where, you

know, if it doesn't work the phone goes off.

Another key piece that I keep running into, thinking about how to roll out some of this stuff is that being able to adapt to these changing market conditions. And if you look at PJM there's hundreds of business rules just to automate one demand response program.

Now, in Cal-ISO it might be a whole different set of business rules. If we just knew the basic data packets, just focus on the common information and how you access it. Joe, and I think others, have talked about this idea of just get us access to the information and the vendors will figure out a way to make value out of it and give it to their customers.

So, if we can do that then we can figure out how to resolve all the different business rules that exist when you move it from one market to the other. Because we do not have a uniform market. And everybody remembers what happened with standard market design; it failed because of that exact reason.

I think another key piece here that everyone's aware of is that, you know, there's a huge, and this has been our experience, being a

small entity out there, of going out and installing, configuring, I would say, installing, maintaining this stuff, is that every time you send one person out to reconfigure something that could lose the whole value for the year of what you're trying to do.

And so this idea of being to auto configure things, if you have access to the information, you know what it means, and I bring up the semantic web here, because I think we have a lot to learn from the web.

This idea of ontologies, every time we say this word people look at us and turn the other direction, but my analogy is if you look at it like if you're defining in the wine industry Merlot, and you want to be able to know what that means, you can set a reference point for it. Say go look at the ontology. It'll describe that a Merlot derives from some other vine, blah, blah, blah.

But in another industry Merlot might mean a color. In our industry, when we start integrating with the web, we're going to define things like energy and capacity and price and there's going to be thousands of other definitions

like that.

So the idea of once we define what we think it means, I think that's really significant to then allow it to integrate with the rest of the world.

The last thing is large-scale integration, in my mind, goes beyond, I think everybody agrees it goes beyond the meter. I mean who's to say whether or not the cellphones that I've seen are a lot more functionality than any meter I've seen recently.

And so the question is, is the cellphone going to be blue-toothing to the meter to read it, or is the meter going to be doing all that. I don't know. But it seems like if we look at it beyond the meter then this is a lot more significant than what we're talking about with just the meter stuff.

So, and I guess everyone benefits. I mean the customers benefit and everyone does. And that's -- those are my comments. I'm sorry I didn't have any questions because I'm actually very familiar with a lot of the things that are going on so I don't really -- I support them a hundred percent.

MR. GUNTHER: Thanks, Dave. Okay. At this point we've got about 20 minutes or so for a facilitated discussion, for some open questions from everyone here for the panelists.

And, of course, I'd invite the Commissioners to ask those questions first.

MR. MESSENGER: Do you have a question? No. Okay, I'm going to just throw it out here. I've been spending my whole morning just trying to listen to various nodes or areas of interest.

And one of the things I'd like to ask the speakers is from your perspective, assume for a second that there were three areas that we identified that would be productively addressed by reference design. And it might be like information exchange or, you know, exchange between nodes in the network and onsite control systems, or whatever it might be.

In your experience is it best to try to prioritize which comes first, second or third? Or set three different groups off to work on three different reference designs and then come back and try to integrate them into a whole?

And that may be too abstract of a question, but I throw that out to any of the

panelists.

MR. BELL: I'll see if I'll throw a first answer out. The way we've been looking at it at OpenAMI is it's a system, a complete end-to-end system. So if you actually split it apart you'd end up with three -- possibly with three things that would then have to be integrated back in together.

So if you think about the problem domain, an AMI network is a network. It's a large network. And whether you're just collecting information or having two-way communication and upgrade-ability, those are requirements. But it's a network.

Now, that network has interfaces on it. It has an interface in the back office which are systems. And it potentially has interfaces to the premise.

And so the way we've been looking at it is there's really three domain areas. It's the back office systems, the network and the premise. And, you know, there's a lot of synergy with the consumer portal work which is looking at building defining devices and the premise that need an interface to the network.

If you look at demand response systems, they have interfaces that want to talk to the meters over a network. And so we really see it as a combination of that complete solution, yet the key here is to really keep it focused right on the core set of requirements.

MR. SCHOMBERG: Well, I'd like to offer other evidence. Well, when the problem is well defined and that the state of the heart of the -- is established. Then you can, well, split the problem and work very efficiently in parallel.

Here we are dealing with something very very tricky, which is known material business that's information. And as we outline here, maybe the meter that we have been discussing until now is just the tip of the iceberg.

And dealing with highly complex system or even we could say non-assessed complexity, there have been a lot of experience in non-utility business. For example, the FAA has been refurbishing the air traffic control system. That was 10 or 15 years ago. And when you have that size of system, which is, I would say, maybe we could compare the complexity because you have real time computing, distributed computing highly

coupled system.

What the people do in that type of application they have competing design teams. And it helps to assess what those teams come out with. But you have to be able to afford this, because it costs a lot in effort, even if it's volunteer work, it costs a lot.

And then you need to have time to compare what comes out. And then make the choice and then move forward.

COMMISSIONER PFANNENSTIEL: Erich, I have a followup question for Richard. You showed in your slides that EDF is going to be re-looking at meters again. I'm not sure that's exactly how you said it, but you're going to be continuing to develop your metering infrastructure.

Given that, and the comments that you just made, what advice would you have to us when you hear what we're looking at here and we're struggling with how broad or how specific we should be, given I think the sort of direction that we have on the kinds of needs that we're expressing, if not all that clearly at this point? What guidance would you give us?

MR. SCHOMBERG: Well, thank you for your

question and your trust. I don't know if I deserve to give guidance, but I can tell you that we have the same problem. We have the same problem.

And I can tell you that we had to pay a very heavy tribute in past projects, very very heavy tribute in intelligent customer interface. Million and million of dollars that went up in smoke.

And in many other areas, which were actually facing the same situation. High degree of complexity hidden and not laying exactly where the people are discussing, but somewhere else, everywhere.

So, what I would do is I would avoid splitting the problem we think we understand too early. So it's very tricky, because in the U.S., a huge strength of the U.S. is that ability to into action very very quickly. And how you're efficient in the action. You have to split the problems.

But if you do that too early, on something that actually -- let's say you break out a problem in three or five pieces. If actually the pieces are too dependent one to the other,

well, that's the end. But you discover that very late.

So I don't know if I'm very useful there, but I think I would be very cautious. And I guess that there are techniques, there is a lot of experience existing not in the utility business, in developing large-scale systems like the FAA air traffic control. You see the airplanes, you cannot afford -- well, they have to fly all the time. You cannot afford any failure.

And there are many other business, also; (inaudible) simulators, NASA, I've been able to visit that type of project, because we've been working a lot on complexity and trying to find out the way to cope with that type of project.

So, that means I would say that in the U.S. there is a lot, a lot of experience to tap from. And I would try to, well, copy or use that experience in some way.

COMMISSIONER PFANNENSTIEL: Thank you.

MR. WATSON: Yes, I'd like to comment on this --

MS. TEN HOPE: Would you go to the microphone?

MR. WATSON: Along this same line of

thought it sounds like there's an interest in rolling up our shirtsleeves and getting to work, and possibly even breaking into groups smaller, maybe not today, but some time in the near future.

One way that that can be done, I feel, even on a complex challenge like this would be to identify the different actors on the system. Those are the parties that take information from or give information to the system.

Then when we -- examples might be, you know, a utility, a customer, a generator, a regulator, might be different actors. If we could have each of those first identified, and then if each of those groups could speak or boil down their interests and comments into a smaller set of comments and questions, then I feel that that could be work done in parallel in separate groups; and yet it would contribute to the overall effort.

MR. MALCOLM: Maybe, I think many of the people that commented on this brought up some excellent points. I just wanted to offer some possibilities on compromise.

In the ideal world, I think, having, you know, competing designs would certainly guarantee that you could kind of more or less select best of

breed. Perhaps a hybrid approach where I think, Mike, you had mentioned maybe three areas as a representative number, having a fourth organization that provides the oversight or the integration would be able to identify where some of the subgroups would diverge; would be able to look at some parallel activities and see if one approach might be better than another.

As Richard mentions, there's risk if you do that too early in the process. But with the proper design and structure of an oversight committee it could better manage that risk.

MR. GUNTHER: Okay, all the way in the back first, and then --

MR. SCHWARTZ: Again, I'm Peter Schwartz. I'm an independent energy and infrastructure consultant.

Given the last comment, I think an earlier comment from Mr. Bell, I think we have an existing successful model for what you just described. And it goes back, and Art will remember this, the DSM collaborative that brought together key stakeholders in the industry to provide that type of structure, guidance and policy initiatives.

So we have lots of efforts going on. We have working groups. We have open architecture. We have things going on around the world. And the problem is they're not all coming together under a common framework to deal with this.

Additionally, I had the pleasure of sitting in on last Friday at the League of Women Voters session at the PUC on keeping the lights on in California. And one of the key things at the end of the day, after having all the industry experts talk about how to keep the lights on in California and deal with these issues, was there was no one agency accountable for dealing with the infrastructure questions.

And lacking that accountability or empowerment, it was very difficult to move forward on any of these issues. And demand response definitely falls within that category. And I think the need of a supergroup, ala the DSM collaborative, is called for.

The other thing I wanted to just touch on was I've been involved in dealing with complex systems and buildings. And it gets very dangerous providing reference design or criteria based on individual components and so forth.

And I found it much easier to deal with and allowed much more innovation within the marketplace if you are looking at establishing reference designs on performance criteria rather than specifying what the solutions are. Because we have a wide range of technology that is just coming at us on a daily basis that is whether it's wireless or powerline carriers, that if we're looking at getting at the data, let the industry come up with the solutions, as long as we're establishing what do we need from that data. And how does it need to be communicated, over what timeframe and for what purpose.

I think that might be a better approach to the reference designs. Thank you.

MR. BELL: I'd like to just make a comment to that. I think, having been involved in this in the last year, and looking at this building products, too, in my opinion this is a fairly well defined problem. It's not an amorphous problem.

And so one of the reasons, you know, we were kind of asked to get involved and kind of get a group of industry people together was because people are, you know, see it as a big problem, but

it is very well defined.

I mean what we're talking about is implementing a metering infrastructure to support dynamic pricing in this state, as well as others. And that has a lot of information that's going to flow from that.

These are not real difficult ideas, these aren't real difficult problems. They're well defined problems. And, you know, in my career I've worked in companies that have competing groups. We've built competing products. Oracle is a great example of that. It takes time.

The other thing about large structures, one of the reasons we built a task force, not an open standards body, is because it brings bureaucracy in time. And so how do you solve timeliness, how do you solve these problems.

And so what we're suggesting is you get customers together who have a well defined set of requirements, who are being driven by business principles. You have the regulators who have a well defined set of requirements, which is they're going to authorize a large rate expenditure and they want to make sure that expenditure is

protected. These are well defined things. These aren't nebulous.

And then you let industry get together and suggest solutions. And it's not one group; it's every single vendor who is interested should get involved.

And I don't know, maybe -- that's my two cents. I just think we can rapidly do this versus turning it into a big, long, laborious process.

MR. CAMP: I did actually have another question for Ray. Just because on one hand we're talking about it's all about information and that's really how we're trying to talk -- what we need to talk about.

But you did keep on mentioning meters. And also you have on the top line that the demand response and AMI implementation must adhere to these requirements. And those requirements would be open standards-based reference design.

So, are you proposing to add additional functional requirements to what's been done by the CPUC over a two-year process within the working groups on the functional requirements that the system has to provide to support demand response?

MR. BELL: In a formation meeting last

week, this topic was discussed. And I think the consensus was that we would take the working group three work as a starting point. It was a lot of smart minds went into that, you know, put it together. It seems to capture what the regulators were, you know, looking for, and what the customers were looking for.

So, it's a matter of taking that and getting more input on it.

MR. CAMP: Well, see, that's kind of part of my disconnect, because if the reference design is a minimum standard, you know, the little pyramid that we saw were the minimum requirements, if that's a starting point, then where are we going to go? Are we going to add something more than the minimum?

And if those are going to be the requirements then they're not minimum requirements anymore.

MR. BELL: I don't follow your question.

MR. CAMP: Especially -- well, I mean there's a real disconnect here on -- the one area that the CPUC has not ruled upon is how all the information is going to be passed.

But in terms of the functional

requirements to support demand response, we have come up with those answers and what the minimum requirements are.

So, I don't think we need a starting point on what the functional requirements for the system will be. Now, how that information is passed, and those open standards, that makes sense. But the functional requirements to support demand response, those minimum requirements have already been established.

And to go back to Gayatri's earlier, you know, she came up here right at the very start, are we going to derail the CPUC OIR on this by trying to implement new requirements beyond what the CPUC process has already provided.

MR. BELL: Let me see if I can address the question. When we looked at how to build a reference design you start with requirements, right. From there you need a common dictionary or data model that can be consistent across that set of requirements. Not vendor specific, right, but detailed enough that some developer can build a product to it, and that vendors can integrate to it and extend it with their functionality.

It doesn't define any form of transport.

It doesn't define any methodologies. It's a means not the methods.

And so the consensus last week was, hey, look, a lot of great work's been done to get those requirements. This is the first working group tomorrow. Let's review them, you know. Someone sent us the stuff out of Ontario. A lot of great work from there, right. We should look at that, too. Why not. This is not just a California problem.

But hopefully this will be rapidly done, and we can move on to the next step, right. So we're not suggesting that we go back and redo something. The group's consensus was here's some good stuff, let's look at it. It may be a real quick meeting tomorrow and we can move forward.

MR. CAMP: Well, I'm just trying to understand. Just so for clarity for a lot of the industry, if they meet the CPUC requirements as defined in the working groups, OpenAMI work isn't going to somehow come in and require additional functionality, and therefore has to re-review that process that's gone on in front of the CPUC?

MR. MESSENGER: I have an opinion on that, not necessarily --

MR. GUNTHER: Before you step away, could you give us your name and affiliation?

MR. CAMP: I'm sorry. Ward Camp, DCSI.

MR. MESSENGER: From my perspective, I can understand people's concern that you work for two years on a process and now it's all going to slow down or go in a different direction. And quite frankly I have a vested interest to make sure that doesn't happen, that we actually reach a decision.

So, I think that's going to happen. And really, you could think of the reference design perhaps as after the decision is out a final check the utilities want to make in terms of future changeability.

They might say, okay, we now have a decision in front of us. The Commission has adopted a certain form of revenue recovery; we're going to move ahead.

But now we want to take this system that we've signed contracts with vendors in and compare it against this reference design to see if, gee, maybe we want to have a change order to make sure that we cover this function that the regulators forgot to mention two years ago. You know,

there's some important dimension that was left out.

So I would see it as a quality control/ improvement possibility as opposed to something that would require people to go back and, you know, re-bid the whole stack, or, you know, change vendors or anything like that.

So it's an attempt, I think, to add to a product that's already started, as opposed to creating something new.

And I think the real question that still remains in my mind is, you know, there are a set of six, what I call functional requirements that are very clear that's already been laid out. The question is what's the next step beyond that that has value both to vendors and to the buyers, in this case the utilities and the customers. And that's what I think a reference design is designed to explore. Can we add more value beyond those initial six or whatever; you know, or should we stop there. I mean I don't know the answer to that question. And I think that's what they're proposing to at least explore.

And it may be that it turns out they decide there's not much we can do in the way of

functionality. Maybe we need to focus solely on information exchange. Now, I don't know what the answer is.

MR. GUNTHER: Okay, we're pretty much right on time, Mike, so basically we're going to move on to our 3:00 agenda item, which basically is facilitated discussion with Mike leading the way here.

MR. MESSENGER: Okay. Can I suggest a slight alternate? Can we have like a two-minute break to stretch?

COMMISSIONER ROSENFELD: Maybe four minutes.

MR. MESSENGER: Then we can come back to this discussion.

(Brief recess.)

MR. MESSENGER: This next part of the meeting is designed really to give you an opportunity to feed back to us what you've heard today. And there's some questions on the agenda that I'm going to go through.

But before that, I feel like it's important to assuage some fears that I've been hearing throughout the day that somehow the reference design process is going to either

sabotage or slow down the CEC/PUC process.

I don't think it's going to happen and I'm going to give you a slight, a very quick PowerPoint that talks about sort of the very high level we started at, and where we might go the next step. And I don't think there's a very significant possibility that we could actually slow down the process.

After that I'm going to switch into completely neutral moderator, and I'm going to try to test the audience on some of these questions. Basic questions like after hearing, you know, four hours of talks about reference design do people have a better idea of what a reference design is, or is it more confused now after having heard all that in the morning.

And so I'm going to try to draw some consensus and try to figure out where we should go next. But first I'm going to do this PowerPoint.

My understanding, perhaps limited, is that there are some functional requirements that have already been established by the PUC. And the next step is can you take those functional requirements and make them into a reference design. Not change any of it, you know, people may

want to change some of them, and I think the PUC would probably resist that, but they may say, hey, you missed an important function. That's fine.

But to me the next point is after you have the function requirements, what do we need to do in terms of translating that into a reference design which then goes on to get RFPs and specs and you build the system.

So, next slide, please. So here is an example. And I want to caveat this, this is not truth, okay. This is not something that's been adopted. The only thing that I'm sure is in there is this policy goal number one, okay. And there's actually six policy goals up there the PUC has already adopted.

It says basically we want you to be able to support dynamic pricing for all customer classes. And, you know, it says assume certain things like you're going to have monthly billing and the capability for customers to change their tariff reference. They can say this year I want to be on a flat rate; next year I want to be on a real-time rate; after that I want to go to CPP.

In other words, we want to be able to have customers be able to make different choices

without having to visit the home again and reprogram the meter or something like that. It has to be very flexible and easy for the customer to understand.

Now, from that requirement, or policy goal is my words, someone has to figure out, okay, well, what are the sort of functional specs here; how do we design a system to meet that policy goal.

And I've seen some people put things like this. And so think of this as this could be a draft reference design, maybe not. We'll have to give it to the industry and they'll look at it.

So, you know, people will argue about, you know, what's the proper interval for energy usage data; is it 15 minutes or an hour, or 15 minutes. And ideally, from my perspective, you say, look, define a default, but make sure you could change that over time. So you may decide you want to collect data for hourly intervals for a customer in 2004, but in 2010 you want to go to 15 minutes. And in 2016 you want to go to minute, you know, or something like that.

Well, you have to build in the capability to remotely change that preference over

time. Similarly, you know, this is really the province of the utility, you have to figure out how often you want to pull or gather that usage data from whatever the collection unit is. And, you know, I would say you can't figure out the answer to that for sure definitively for 20 years.

So you have to build in the capability to reprogram that so you might start doing this once a day, and then decide you want to do it once every five minutes or in emergencies. For some customers you may only want to do it once a month because the load is predictable and flat, you don't need to know that information.

And then the other thing that I think probably follows dynamic pricing is that somewhere in the network you need to be able to notify customers of changes in either prices or system conditions. And I put here on a day-ahead basis initially, and maybe within minutes to seconds in the future. We don't know, depends on how the technology evolves.

So, basically collection, taking the data and processing it into a bill, and being able to notify different people in the network of changes to either system condition or prices.

It's this sort of very top level of what you might need to meet this policy goal.

Next slide, please. Now, the ones that haven't been defined yet, from my perspective, and I put TBD, you know, the PUC and the Energy Commission had a goal of customer access. Make this data available to customers so they can understand their patterns and how they relate to costs. And as far as I know, there are no functional requirements that have been laid out for that. I don't know what that's going to require, and that would be something that this industry group would have to tackle, you know. Is there anything we can do here or not.

And similarly the next one. You know, there's a desire from people who are interested in energy efficiency and energy management that these systems should be able to import data into the energy management system and support energy management, diagnostics, customized billing, complaint resolution, all kinds of different functions that the utility or someone else in the system may want to off. And, again the functional requirements for that, or the reference design for that is blank right now. We don't know what it

should be. And maybe that's all we can agree on is policy goal number three, and you're done. So, who knows.

Next slide. Support increases in service reliability. And this is just a very broad one, you know. We want to increase and enhance system reliability, improve customer service reliability on the individual level. And possibly include remote metering, metering outage management functions, detection of energy theft, improve load forecasting by able to looking at load curves in real time. And maybe even workforce management in terms of distribution groups. All those things are possible. And, again, we don't know what the reference design might be for any of those.

Next. This one, I think, has been touched on by speakers before, you know. Easy upgrades, which basically means to me that upgrades can be achieved by software downloads rather than businesses changing out hardware. So that's just sort of a -- maybe that's an architectural principle, as opposed to an actual policy goal.

And then the last one, and this is the

one that's most controversial, is that some people think the load control interface and networking system should be part of AMI. Other people say no, design a separate system. Don't overly burden the AMI system with some kind of notification signal and control things.

And so to me that's, again, to be determined. You know, some people would say, well, we don't necessarily need to verify the load reduction, we can estimate it. So these are all questions of degree.

But I would argue that if you're designing a system for 20 years you want to at least explore whether the system can support those functions. And you may decide, as an industry, you can't yet. Maybe that's something you do ten years from now, I'm not sure.

So, to me, that's the end of my slide presentation, and now I'm going to move into getting your feedback. Those are the things that have to be defined in the reference design process, at least those set. And there's probably a lot of others I have heard today, to see if we can make progress beyond the functional requirements that we have already.

So now I'm going to switch into try to ask you questions and get your feedback. And I'm hoping that you will find this not to be intrusive, but I'm going to ask you some questions that ask for a show of hands. And this is not like a vote or anything like that. I'm just trying to get an idea of how much time we need to devote to each item, so just give me your general preference.

And so the first question is the one that's one the agenda is: Do people understand what a reference design is? And if you don't, raise your hand and that indicates to me that we need to spend some more time trying to figure out, giving you better examples that are more specific to the metering industry, or, you know, getting that as a charge to the industry group. Come back with a better definition of reference design.

So, show of hands. How many people think as a result of today you have a better idea, or are close to understanding what a reference design is?

That's remarkable. I thought it was only going to be 50 percent. That's good. Okay.

Now, next question, and this one's a

harder question, how many people think there's a need for a reference design in this area of AMI? That as a result of listening today that there might be a need?

Okay, how many people don't? No, I'm just kidding. Okay. So there's still some people who aren't convinced. That's good.

Now, let me make sure I'm not skipping my question here. Next question is: We've had some people outline a process of how you might develop and implement a reference design. Do people have a pretty clear vision in their head of how that should happen? I think the model is -- and I'll ask you if you think that this is a good model, the model I've heard so far is the regulators have already given their input. And to a certain extent, perhaps the utilities have already given their input by drafted RFPs. And these are the kinds of things we want the system to do.

So now the next step, as I see it, is give it to an industry group and say go off and develop a reference design that meets these function requirements. And come back to us if there's function requirements that we've set out

that you don't understand, or don't make sense to you in whatever way.

Have to have some sort of feedback loop so that there's one that we put in there that it's either too costly or you don't understand for the industry to come back and say, well, we can do these four, but these other two, you know, they double the cost of the network or whatever it might be.

So, the question is, do people have a good idea, after today, of what the process should be? Or do you think we should spend some more time today talking about alternative to processes to use to develop a reference design?

So how many people have a good idea? Show of hands. Good idea of what a process might be.

Not very many.

Okay, how many people think we need to spend some more time thinking about the process?

Okay. Does anyone have a particular view of a better process or a different process that they would nominate, rather than the one that we've heard today? Or do you think that we just need to spend some more time internally working on

a process and then coming back to the group?

A better process. Go ahead, sir.

MR. MILLER: Eric Miller with Itron. Having been a veteran of a fair number of collaborative processes like this, or potentially like this, the ones I've seen work best over the years are where generally the regulatory process defines a scope and a schedule, and says we need this pinned down and we need it pinned down by this date. And then industry, you guys go figure it out and come back with an answer.

And I think we've had generally, I, at least, have been part of a bunch of those that have gone pretty well.

What I've seen not go well is where there's an undefined scope of what you're supposed to come back with, or when you're supposed to come back with it. And to be honest, that's kind of where I feel a bit that we are right now, is it's not clear exactly what we're coming back with; what our charter is; what the schedule is.

And those, frankly, I've seen, you know, can have more difficulty. So personally I'd suggest if we can pin that down about what we really need and when, then I think you could come

up with a much -- then it would be easy for people to get together and know what to do and much more optimistically come back with a good answer.

MR. MESSENGER: Okay, so I want to make sure I heard you right. Both the scope is undefined and the timetable.

MR. MILLER: Yes.

MR. MESSENGER: Okay.

COMMISSIONER ROSENFELD: Mike, I think I'll make a comment, if I may.

MR. MESSENGER: Certainly.

COMMISSIONER ROSENFELD: It's sort of answering Eric. I'd like to point out from the regulatory point of view that, Eric, you're right there. There are two different time scales, and I just want to remind you. When it comes to just the meter part of the system, there are business plans in or coming in and requests for proposals out, and the clock is ticking.

But that's only -- okay, in the thinking that's gone on so far, I believe the meter part of it, which I'm talking about, is going to be mainly a, it's the utilities who are going to order them, install them, pay for them. And the clock is ticking.

For the complete system we need demand response, I mean just as I said this morning, no bloody good without demand response. But there is no clock ticking. That is, the first clock that will tick on that is probably that when it comes to new buildings, the Energy Commission having the responsibility for title 24 and title 25 standards, will want to say something about what sort of user interface is, thermostats, controls go in. But there is no clock ticking.

So, although, you know, if we'd had the wisdom to start all this two years ago, I would be urging that we look at the whole package. I think, given the realities, we probably want to look at part one, the meters, first. Or at least talk about a reference design for the meter part only first. And have a little more time on the controls part.

MR. MILLER: If I could just comment, the other area I think that can move quite quickly is at the top level of the data interface portion of it. I think that that's actually something that could happen that would be of value, immediate value. And I think something that could happen pretty quickly and pretty easily.

To me the challenging part is the meter network; it's that last scale of communications and what you want there. That's the part where you have to optimize things very much to hit cost and performance goals that when you define a broad range you end up only going with the most costly, which then makes the business case not work.

So, I think some basic things about what information you want to get out of the meter, out of the customers' site, and what information you want to get to the customer, and the data interface are things that could probably be done very practically and quickly.

MR. MESSENGER: Okay, let me just say before I take another question, when I was writing down notes I noted there was three possible scopes of reference design that were referred to by people today.

One scope was just what you mentioned. Don't worry about the innards of the system, just focus on information exchange at the nodes. You know, what are the protocols or common language requirements, so that people who want to use the data that's (inaudible) can use it and process it and don't have to worry about decoding a secret

code to get in.

The second one that I heard was the mapping of the Commission's policy requirements and the utility's business objectives into a reference design. That was the second possible scope. That was a pretty broad scope.

And then the third one is the one that I think Mark was hinting at here, which it's not enough to understand how the meter's got to collect energy usage data and process price signals, you need to have some kind of communication program module between the network and the control systems onsite.

So, people argue about whether that should be through the meter or through some other communications. We don't know right now.

And so that's the third possible scope, is deal explicitly with whatever level of communication needs to happen between the network and either onsite equipment or onsite control equipment or that type of thing.

And so after laying out those three scopes, what I heard some people say is well, all those could be dealt with in a reference design simultaneously. And other people said, well, no,

focus on splitting out one of those two things that are high priority and working on the (inaudible).

Does anyone have any reactions to that? Go ahead.

MS. RABL: Veronika Rabl. I think what's happening here is that some of the goals are better defined than others. And so I would sort of proceed the way you were hinting. Take the piece that's well defined and ship it off, let them do functional requirements and architecture and whatnot.

Adding to it other policy goals that are already in place. Because demand response of the metering is not the only thing that's happening. There are privacy issues; there are data collection issues; there are energy efficiency programs. And they also may have implication of what it should look like.

And then separately look at two additional dimensions. So maybe more additional dimensions at the goal level. And that's what are the goals for full implementation of demand response. Or what are the visions of the future. What it is we want to be able to do, I don't know,

five years from now, ten years from now, 20 years from now.

And that may be define a much broader set that can proceed in parallel with this very narrow and well defined piece of work.

MR. MESSENGER: Okay. Other ideas? Chris.

MR. KING: Hi, Chris King. I'm with eMeter; do a lot of things. I did want to say on behalf of the Silicon Valley Manufacturers Group Energy Committee that I'm on, the interest there is having a standard at the system level for exchanging data. The customers are really interested in getting access; being able to do things with it.

And would advocate focusing on that level, as opposed to the other levels of the system. And that certainly supports being able to do a lot of different things.

And I also wanted to make the point that the Commission requirements that you put up there already included the load control energy management. So at the high level, at least, it's already included as a requirement.

MR. DOMINGOS: John Domingos. A

question from, I'll say a perspective question. It seems to me the ultimate goal might be that a building or a group of buildings could qualify as quote, "spinning reserves."

I mean the whole idea that the grid is a system basically deals with stress during a certain finite period of time, and historically the mindset was we have, and I remember when I visited the Power Authority once, they had this incredibly difficult task of financing that last five or ten or the power plants that only come on for a few hours a year.

And so when I thought of buildings as an alternative, then the question is what would we have to do in order to cause buildings aggregated in millions of square feet to represent spinning reserves.

And so maybe it's a matter of looking back how that has worked historically. Because that's the historical model is you build little power plants everywhere, I guess, and there's a problem, and you start them. Well, what's the standards that apply to starting little peak power plants. Can we somehow transfer that kind of, I'll call it framework, over to the world of

demand response.

And, again, this open architecture, this kind of thing we're talking about today is, I think, trying to build an infrastructure that facilitates that, in my mind, is where we got to go.

MR. HOFMANN: Mike, may I just make a quick comment on that?

MR. MESSENGER: Sure.

MR. HOFMANN: The PIER program is funding through CERTS a project that isn't exactly like what was described, but we're looking at the issue of using load as spinning reserve. So I just wanted to make -- it's in the R&D phases. Joe Eto, who's sitting in the back here, from LBNL, is working with Southern California Edison and a company called Connected Energy.

The beginning of that work was presented at the November 30th demand response R&D symposium. And I don't know if it's posted anywhere yet, but there will be results posted as they get going. They're just in the early phases. So that idea is being explored.

MR. MESSENGER: And let me just respond to your comment that one way of dealing with that

is we could go back to the reference design group and say are there additional requirements or specs that you need to build into the AMI network if, you know, we have this goal of ten years from now of having banks of buildings -- going on and off here, sorry -- banks of buildings serve as spinning reserve.

What additional functional requirements would you need, you know. Obviously you need high-speed communication, perhaps, that you don't necessarily have built in.

The last question -- well, actually we had a couple more responses. Go ahead, sir.

DR. KHATTAR: Hi, my name is Mukesh Khattar; I'm with Oracle Corporation, one of the very few end users over here. And I also represent large energy users from the Silicon Valley Manufacturing Group, along with Chris here.

We have discussed it quite a bit and we like the whole approach, but I think one of the things that you are missing right now, which we need to add soon, is the ability to be able to transfer the data to the energy management systems of the end users. So that we will be able to make some decision on a real-time basis.

Right now the information comes to us maybe a day late, like on different programs. We can go and historically look at the what-if scenarios, but we cannot really do anything until we have the real-time information coming to us.

And all the new energy management systems are sophisticated enough that they can pull the information if there is an interchange protocol available.

MR. MESSENGER: Okay. I think that's it in the functional requirements. I just don't think it's actually been debated yet.

One other thing -- hopefully the regulators will get feedback from this. From my perspective, the regulation put out functional requirements, six of them, without a cost to each of them. And so it may be that some of those functional requirements are too expensive to do, even though in theory everybody in the room will say that's a great thing, let's go ahead and do that. And this may be an example, I don't know.

But clearly one of the functional specs is make sure that that data can be available in real time to customers to use in the energy use management systems. Whether we can do that or

not, what the cost is, is not yet clear in my mind.

Go ahead, sir.

MR. WILSON: Good afternoon. I'm Boyd Wilson representing Celerity Energy. We're a demand response provider here in California.

And the demand response season officially starts for us on June 1st, so we have about four months before we start shedding load.

So my question is, this process, this reference design, I'm hoping that we can start receiving information and that the utilities, the IOUs, can start receiving information, and it's not going to be held up to wait for the final product. I'm hoping as soon as something is certain, that they can start releasing that information so we can start applying it to the systems we have out in the field, and with our customers, and with the utilities' customers.

One thing I'm afraid of is that the investor-owned utilities will not move on this until they get the final document. And I'm hoping that the IOUs will work with the demand response providers, and work with the CEC and the CPUC to move this along quickly and implement it this

year, and not wait until next year.

I know in the critical peak pricing comments that were released last week from three IOUs, San Diego was very clear and they wanted to cooperate. Edison was less clear. PG&E was clear, but they wanted to put it off for a year.

And I'm just hoping that we can implement this for this summer, because we all know what the summer brings. Thank you.

MR. MESSENGER: (inaudible) vacation --

(Laughter.)

MR. WATSON: Hi, Dave Watson, Lawrence Berkeley Lab. I just wanted to point something out, kind of a red flag, if you will, to be aware of, is that yes, we should design systems that can be remotely upgradable. But there are certain aspects of a system that cannot be remotely upgradable.

And when you're trying to cost optimize every single individual component, things like latency, through-put, security, scalability, those kind of issues you need to look at the worst case scenario from the very start.

So, Mike, when you're saying things like, well, today we'll read every 24 hours, and

next year we'll read one hour, and the next five years it'll be one minute, we need to know the one-minute part now is the point.

But that's not to say that programs can change to things that we can't even imagine 20 years from now. It can be a different program. Because that's not through-put dependent, for example.

MR. BELL: Yeah, just to follow up on Dave's comment, you know, the thing that's striking me here is, you know, the internet's not built on any one router, or one manufacturer's router. And that's really some of the challenges we have, you know, which is we're talking about building a very large network infrastructure in this state. And there are existing solutions today that just don't work together.

And I think besides meter interfaces and data interfaces, we have to look at that because it's kind of critical, as a ratepayer, you want to make sure that's an evolutionary network, not a, you know, forklift network. So I point that for requirements.

MS. CLEVELAND: Frances Cleveland from Utility Consulting, International. We've had only

one mention of distributed energy resources from Dave. And I'm wondering whether this is being conceived as part of the DER -- DR, excuse me, demand response program. Because we've been talking almost strictly about meters with every other respect. And yet it seems to me that distributed energy resources are going to become a very major factor in the demand response environment. In other words, not just lower load, it's raised generation.

So I'm wondering if any of this is going to be added in.

COMMISSIONER ROSENFELD: Frances, I don't want to seem repetitious, but when I showed my last slide this morning I think the last bullet said that in the opinion of the Energy Commission this system has to be consistent with net metering and with kilowatt hour based performance incentives, so we don't have to just rely on nominal kilowatts on the -- photovoltaics on the roof and so on.

I think you won that battle.

(Laughter.)

MR. MESSENGER: But let me say, I think she brings up an important point, because if you

look at the six functional specs I put up, net metering was not one of them. And that was one of the things that, you know, maybe in hindsight we should have put up there, but it wasn't up there. So I think that's a dilemma for utilities now, is to try to figure out to what extent their AMI systems have to be compatible with net metering or not.

MS. CLEVELAND: Yeah, it's not just net metering, it's actually selling the generation back, more than the net metering.

MR. MESSENGER: Okay. Sir, you're next.

MR. EUSTIS: My name is Conrad Eustis; I'm with Portland General. And I've done enough pilots here to fill a case, and I've watched over $300 million like EDF has watched it disappear into the corporate -- people trying to develop this stuff.

So when you talk about the process you've talked about, well, is it time to hand it off to industry to develop the reference case, I'm not clear on your process, who industry is. And I'm not clear how they collect feedback for their, you know, for their reference case.

MR. MESSENGER: I have a proposal that

only formed a couple of hours ago, so I'm not sure this is actually --

(Laughter.)

MR. MESSENGER: -- the right process. But, one proposal is to simply say, you know, to take some of these documents that the PUC and the Energy Commission have already done; say here's the functional requirements; and hand them over to this group OpenAMI. And say, you know, you guys, we want you to -- we'll have an order that says come back to us in six months and either give us a finished product or give us a status report on where you are in terms of implementing at least a reference design for what we want.

And I would also encourage them, although this may scare some people, to ask other users if they have functional requirements that aren't already in the order.

So, for example, if there's, I don't know, IBM or some large corporate users who look at this thing and say, well, but you've forgotten an important functional spec for me, as your customer, and it's this. I don't know what it might be, you know, I don't know, the ability to teleport human beings across large nations or

something, I don't know.

(Laughter.)

MR. MESSENGER: And whatever it might be. I want them to be able to come back to us and say, well, your functional specs were nice, but you missed these two important ones that our customers want.

Or it may be that the utilities, themselves, have additional functional specs that aren't reflected in the Commission's order that they might want to bring back and say, you know, this doesn't give us enough in terms of security or whatever might be necessary.

And then the process as I envision it would be the regulators would then say okay, this is a reference design; does it meet our needs. If the answer is yes, maybe we're done. Just say great, and we encourage all utilities in the State of California to continue to use this reference design and refine it every five years. So that might be the end of the process as far as I know.

Or we might say no, you really missed it, you know. As far as we're concerned, you missed functional spec number two. You need to go back and try again.

After having said that, that's a regulatory-centric view of the world, and that may not be the right point of view. It may be that we should just get out of it all together. I don't know.

I don't remember who was next. I think you were, sir.

MR. WYLIE: Hello, I'm David Wylie with ASW Consulting and the Ancillary Services Coalition, one of the few remaining aggregators of demand response and have been for the last five years.

First off I'd like to just commend the activity over the last several years of getting real time metering or interval metering down to 200 kilowatts. It's facilitated the addition of many businesses into demand response that otherwise couldn't have. So that effort that took place over the last several years has rendered capability that wasn't there. So that's sort of a look of what's continuing to happen here.

Getting data from the IOUs a little better. It only used to take six months, and now we're only down to one month. That is if they can find it at all. So the infrastructure of getting

to the data is improving. And as a facilitator of demand response, that's very important.

The smart demand responders put in their own telemetry system. They can't rely on the meter. It's not fast enough. You can't always get the data. It's also expensive. So for $800 you can get your own data and forget about the utility meter.

So a paralleling effort has taken place in place of having an accurate real-time meter at the site. So this effort could bring that, and we don't have to put two metering systems in, just one might do it.

And lastly, kind of see the whole thing as a carrot and a stick. If we use the carrot method for demand response, you just pay them what the ISO would have otherwise paid. And that's not here. We're about half or less or by the time the DWR got done with it, it's worth maybe about a third of what the ISO pays. So the carrot doesn't exist.

If we're going to use the stick, then we need the meters. Because the meter is the stick. You know, you're going to pay a dollar a kilowatt hour plus penalties if you don't. And the only

way to enforce the stick is to have the meter.

I'm more of the perspective that the carrot works better because some businesses are inherent good demand responders and some just can't do it no matter how big the stick is. So putting meters at sites where they won't and can't do it is, you know, utilizing resources inappropriately.

So, you know, use the meters where they need them. The smarter they are the better the infrastructure, the better our demand response will be.

I don't know if that was a question or encouragement, but --

(Laughter.)

MR. MESSENGER: I'll take it as a positive statement. Sir, in the back.

MR. BENSON: John Benson, Comverge and long-suffering working group three member.

(Laughter.)

MR. BENSON: Back to the process. I think that Mike's process is useful, the one where we take each of the requirements coming out of the ruling and expand those and turn them into requirements. I think it's something we need to

do.

My only concern about the process as a whole is it's going down way too fast. We need a wide representation of industry involved. I was not notified of the OpenAMI meeting. I'm on both working group three and working group two mailing list. I expect there's a lot of vendors, both in here and elsewhere, who were also not notified of it. And who now have other plans.

And it appears like the process is going down way too fast for a broad representation of industry to be involved in this process. That's my only concern.

MR. MESSENGER: We can fix that.

(Laughter.)

MR. MESSENGER: At least I think we can.

MR. BELL: Yeah, we can definitely fix that. They put out press wires and they tried to do all that email list they could find. But that's clearly something that can be fixed.

MR. MESSENGER: I didn't really get a clear reaction to this process that I put out there in terms of whether it was good or bad. I got some body language both -- and okay. So let me -- I want to just put -- raise your hands. I

proposed a process; does that process or some variant along it sound reasonable to you? Or do we need to do some more thinking about what process we should use to develop a reference design?

So how many people think it's reasonable?

UNIDENTIFIED SPEAKER: Could you describe reasonable?

(Parties speaking simultaneously.)

COMMISSIONER ROSENFELD: Yeah, restate your process, Mike.

MR. MESSENGER: Okay. Right now we have a set of functional requirements that the PUC and the Energy Commission put out awhile ago. And I just showed you a little slide show of those.

So, one possibility is we take that and we hand that over to OpenAMI.org and say, hey, here's the function requirements, see if you can develop a reference design that meets all these function requirements, and at the same time, go out and ask other users if we've missed something.

You know, we've got a list of six. There may be more functional requirements that are important either from utility business perspective

or from the customers' perspective or somewhere else. And give us a report back in six months. And we'll just let you go out and do your own thing, organize yourselves, you know. If you need help with finding rooms, we can do that, but we're not going to get actively involved in your process.

And then, after six months we'll look at that and say, yeah, okay, this reference design meets our needs, and just say, you know, from now on we encourage all utilities to try to build networks that conform with this reference design. Or we say, no, it looks like you missed something.

So that was the process that I was thinking. And I wanted to build in some checkpoints so that, you know, we didn't sort of abandon them for 12 months and have them bring back something that completely looks foreign to what we were thinking about.

So that was the process. So now before I recognize you here, I just want to get a little sense here. Do people think that's a reasonable process, or do we need to go back to the drawing board?

COMMISSIONER ROSENFELD: Is the first

question reasonable?

MR. MESSENGER: Reasonable. Reasonable, put your hand up. Okay.

People think we need to go back to the drawing board.

MR. CAMP: No, but Chris proposed dealing with the data transfers, which is what Joe Desmond and everything else. That's not just going back to the drawing board. You initially said there were three problems. Now you're saying either this one or go back to the drawing board.

MR. MESSENGER: No, I wasn't dealing with that level of detail. But I agree with you, we should give the industry group some direction on priorities. And if we think -- I don't know who the we is here, but okay, some group of people think it's important to do the information exchange process first, great. If that's a near-term deliverable, bring it back.

MR. CAMP: Why don't you ask that question?

MR. MESSENGER: Okay. That's the next level I'm going to get to. But first I want to get people -- this gentleman back here has been waiting. Go ahead. And then I'll get to the

question of priorities. That's a good one, too.

MR. FOSTER: Hi, I'm Tony Foster with Itron. A couple of comments. I guess I sort of support Chris and the gentleman from Comverge and the gentleman from DCSI.

I think the scope and timing questions that my colleague, Eric Miller, brought up are still critical. I've heard scope from the gentleman from SilverSprings that involves a premise domain, a network domain, and I think you called it a head-end or back-office domain.

I heard your sort of three scenarios of scope. I heard Joe Desmond's scenarios of scope. They're all very different. And frankly, what I've heard is that industry needs to determine it, which puts it into the gentleman from SilverSprings camp on what the scope is.

Timing, I've heard you say that it shouldn't change the timing of the CPUC process at all, where we stand now. Which means business case is due in six weeks. We've got orders for go, no-go and deployment within, what, three to four months.

What I heard the gentleman from SilverSprings, who again is leading the industry

group or de facto or, you know, attempted industry group in doing this, saying we'll go to a reference design that comes out with requirements that developers can develop to, is specifically what I heard him say.

Developers developing to oftentimes might take 12 to 18 months. Utilities deploying, frankly, in large scale, they want to test them, prove them. That usually takes a year or two. So we're talking about extending possibly this process, call it two and a half to three or four years.

I, for one, personally speaking for myself, don't have time to spend another three years in this process. So we need some clarification on timing and on scope.

MR. BELL: So, I'd like to address that. First of all, those three domains are actually out of the working group requirements. They're defined as requirements in there.

The second is all these other vendors who are present today were actually had representatives at last week's meeting and were given notice. So I'm sorry that the people in this room didn't get it, but we'll do a better job

with that.

And third, you know, acting as a facilitator you have to, you know, stand up on stage and get to be talked at, but that's okay. This is not our initiative. And if you look at on the website that we posted and the rules, every single individual or company is invited to join. No one has any preferential treatment. No one has an extra vote.

This is about getting together and working. It's not about starting products from scratch. It's about setting requirements for products that utilities can buy on an ongoing basis that exist today and will exist in the future.

So, I just wanted to retort to that comment. Thank you.

MR. MESSENGER: Yeah, well, I'll work very hard to make sure that the reference design process does not derail our current process, trust me on this.

But I think that they can work complementary. It doesn't have to be that they work in cross-purposes.

Next comment. Go ahead.

DR. SUBRAHMANYAM: Surbra, my name, from CyberKnowledge. I just wanted to make a quick observation probably adding to the confusion that's gradually developing.

I just heard --

(Laughter.)

DR. SUBRAHMANYAM: -- several references to the internet and network of different types, and I have also, in the past, been familiar with a different network that used to be known before last night as the Ma Bell Network.

And the main point I wanted to make is that, you know, the internet has been having a lot of problems recently in trying to re-engineer the QS standards and the requirements associated with that.

Whereas the phone network had sort of very specific top-level definitions or specs as to the down time that was reasonable and so on and so forth.

And the point associate with that is that those high-level specs have a fairly large influence on the entire network architecture down to the components and how things are done. And that, in turn, has significant impact on the cost

of the different components.

And maybe this has already been specified by the Commission, but if not, you know, that might be sort of useful to look at as an over-arching spec that sort of trickles down to whoever is dealing with these things. I just wanted to throw that out there.

MR. MESSENGER: Okay. I understood about half of what you said, and I'll talk to you more about that later.

MR. SCHWARTZ: This is Peter Schwartz. I wanted to kind of respond to your earlier vision, and we had quite a few hands raised in support of the vision.

The one caveat that I throw back is we have a long history of going forth with these initiatives and not necessarily getting the right stakeholders to rise to the surface and join the process. And it's been extremely problematic.

And in the systems that we're talking about, and my view expands beyond the advanced metering infrastructure to other customer-based things related to energy information systems and other providers who want to tap into similar data or similar communication channels.

And it seems to me that it might be, you know, I keep going back to the demand response collaborative idea. Unless we have clear sign-off on the vision and goals from all the key stakeholder groups before we launch into coming up setting -- industry and the other stakeholders, to come up with some answers, until we get that buy-off we're in the "bring me another rock" scenario.

Because we do have regulatory processes that can undercut or subvert that effort. And, you know, I'd hate to see us go off and have industries work for six months to come back with something, only to have key stakeholders not sign off on the process, the vision and the goal.

So, I keep coming back to the super user group or the governance board or the DR collaborative, or whatever you want to call it. But I think we need to make that step first before launching into pursuing solutions.

MR. MESSENGER: Okay, and I think that's a judgment we'll have to make is whether or not we have buy-off. I mean certainly agencies perceive that they all have buy-off in terms of pursuing demand response, but whether or not we have buy-

off on reference design and all these other things, we'll have to make a judgment.

And I think one of the things that we might want to do to respond to your concern, because I agree with you that I've seen this problem where someone gets left off the initial board meeting, and then they appear at t he last meeting and complain vociferously about why they were left off.

The result of that is we might want to have some group of people look over the membership of OpenAMI and make sure that it's, quote-unquote, representative. And if it's not, make some suggestions or try to pull people in to make sure it is representative of the wide spectrum of interest that will be interested in this whole process of AMI and deployment.

So we could certainly do that. Gayatri and then Erich.

MS. SCHILBERG: Hi, this is Gayatri Schilberg again, representing TURN. I wanted to insert a comment, it's kind of speaking to the last question, how this is going to work with the regulatory process, but it feeds off some of the prior comments. And so I want to draw a few

things together.

What I'm really concerned about is the impact of this reference design on cost. And there's a couple of ways that it impacts. One, according to the process you outlined before, the reference design committee would go off and do their thing for six months. The PUC proceeding would do its thing, maybe come to a decision that, yes, we're ready to roll out some meters.

Then we find the reference design and find, oops, the meters and the communication systems we decided on don't fit with the reference design.

So your answer was, well, let's do a change order. That is not going to work. You can't take a device that was designed to do one thing and change it in a material way without, as Eric said, a couple years of R&D and testing it and working it out, and the cost then skyrockets.

So, the premise upon which the PUC may decide that, yes, this is cost effective, is now just blown out of the water.

And we can't have a situation where we would say, yes, this is a cost effective thing to do and then raise the cost by amounts. That's

just not going to fly.

The second is I'm concerned in the reference design process about the cost effectiveness of various different functionalities. I know the PUC listed those functionalities and we never had any grounding in cost if that was a good thing to try to go for or not.

And if we allow everyone to have their wish list, we don't have a mechanism to scope things to a reasonable level. So I'm just very very concerned about costs out of control.

MR. MESSENGER: Okay. Do you want to speak to that, Ray?

MR. BELL: Yeah, there's a couple points. And, you know, I didn't do, spend, I think, enough time on kind of the structural organization that was proposed.

At the head of this group is the customers, the IOUs, who have been involved in this for the past three to four years. And so maybe from the CEC side we could encourage them to join that as overall oversight and guidance. And we can reach out to others. So that's from the customer perspective.

From the vendors' --

MS. SCHILBERG: I just have to note and echo Commissioner Grueneich this morning. Very interesting to know that the IOUs are the customers.

MR. BELL: Well, they're my first level, but their customers are myself, right, you know, who buys electricity from PG&E.

But having said that, the vendors who have joined so far have been working on this for years. And I think what's not being suggested is that this is a new initiative, new requirements, new products. And I think your comments are well pointed.

And then the third point is that having gone through these RFP processes, myself, the guidance from the customers, the utilities, have put forth that if these business cases aren't viable, you know, if these products are too expensive, then it doesn't make sense.

So you have market pressure driving technology costs down. You have the customer trying to drive the price of the products down. And the whole goal of standards is to leverage technology which will drive commodity pricing.

Right? It's proven in every other industry. And this is the opportunity to do it, to go from that $800 meter to the $50 fully networked intelligent meter.

You know, we're not there today, but technology will go there. And it will only go there if it's opened up. So, you know, to address all three it's key that we get the right stakeholders, the oversight committee and that's all the -- and to me, that's -- and the customers who would be buying these vendors' products. Other people might have a different opinion, which we could expand that.

The second is that we don't go and recreate the wheel; that we take all the hard work that's been done and defined and try and frame that quickly. Maybe we have two checkpoints so that we don't wait six months, right? It shouldn't, that's a good fear that we should go forward.

And the third is we understand from the end users what their issues are, and get those involved, too. So that would be my response to that, Mike.

MR. MESSENGER: Okay. Erich, you're

next.

MR. GUNTHER: I wanted to just address a couple of the questions earlier, especially the one on the stakeholders.

The stakeholder engagement process is a very important aspect of this process. And it's something that I think we can take advantage of, some of the other organizations that have been represented here today and coming together. All of which have done a lot of work in figuring out what stakeholders are involved and developing those lists of people that can provide input.

The IntelliGrid project reached out to a large segment of stakeholders. The GridWise Architecture Council is doing a similar thing, developing an additional list. We formed OpenAMI underneath, you know, the utility communications architecture group. They've got another group of experts internationally that we can draw from. Of course, the working group two and three work.

So by coming together in an industry group we have the benefit now of bringing together a much larger stakeholder base than we've ever had before, and having an organization that can look at that list and see if there are any holes like

you mentioned.

The other issue about this group, you know, going away for six months, there has to be a continuous process with continuous feedback. Early on, hitting, you know, some of the high, you know, guiding principles, and just getting very, you know, motherhood-and-apple-pie obvious stuff agreed to, written down, signed off on, you'd be amazed looking back on it years later how some of those very simple things, if you agree to those, how much they guide, you know, the development and deployment. You can do that very very quickly.

So, just writing stuff down that is obvious can really make a big difference. So I think, you know, there's going to need to be a lot of that early on in the process to provide that.

MR. MESSENGER: Okay, so I want to do what I said I was going to do before and then let some comments go. I wanted to get an idea about whether or not people agree with this proposition:

The highest priority in terms of developing a reference design is to clarify or describe the information exchange protocols between nodes in the network and users. Some people have said that that's a high priority.

So, how many people think that that's a high priority, working on essentially what Joe Desmond was talking about, the information exchange protocols?

MR. EUSTIS: Is a user a customer, the user of the appliance? Is a user some other business group that's working off --

MR. MESSENGER: Well, the users, at least as I understand right now, are utilities and customers. Right?

MR. EUSTIS: So we've had two different customers. You're talking about how to reach the individual appliances.

MR. MESSENGER: No, no, no.

MR. EUSTIS: No?

MR. MESSENGER: Talking about just gathering data on energy usage, okay. Right now some customers can't gather data on their own energy usage without, from their perspective, extreme costs. Okay. And there's also third-party providers here who say I can't get the data even though the customer has said to me you can have access to the data.

So this is a really, a small, I think, well defined problem which is how do we make sure

that anybody who works and lives in this system that has rights to the data can get the data in a form that's readable.

MR. EUSTIS: Well, first of all, it's huge import like you separate large customers from residential customers, because the need is entirely opposite.

MR. MESSENGER: Okay, we're not debating that topic. I'm just trying to get an indication of -- does that seem like a high priority to people? Raise your hand if you think it seems like a high priority to get information exchange protocols in place.

MR. SCHOETTLE: High priority or highest priority?

(Laughter.)

MR. MESSENGER: I said high priority, but --

UNIDENTIFIED SPEAKERS: High.

(Parties speaking simultaneously.)

MR. MESSENGER: Okay, well, I knew this was going to be hard. In my mind there's three or four things that are options that are on the table here. And I understand your point, which is unless I know the other options I'm voting for.

I just wanted to -- so I'm not asking you for highest, I just want to know if you think it's a high priority that's something that could be done relatively quickly. So raise your hand if you think it's a high priority.

Okay, and --

UNIDENTIFIED SPEAKER: Could you list what the others are?

MR. MESSENGER: Okay, I'll list what the others are, too; although I'm not sure I can do that at 3:59, but I'll give it a shot.

The first one is the one that I outlined on the board which is there's a set of functional requirements from the PUC. And taking the next step beyond those to some kind of reference design. Let's call that option number two.

Option number three is the question that Commissioner Rosenfeld was raising, which is what is the reference design for appliances and equipment to communicate with some node in the network. Be that a collector pole or a meter or something else, you know, because it's the idea of integrating the control into the information. So right now we're just talking about information poles that have been collecting energy use and

sending out to people.

And most people sort of cringe and think that's a longer term process to develop that standard. So that's option number three.

And then option number four, I'm trying to remember, someone else brought it up and I can't -- I guess option number four is what I call the kitchen sink. We're going to do all those things simultaneously. We're not going to set any boundaries. We're just going to say all these problems are going to be solved by this OpenAMI group and they'll bring them back to us. And we're not necessarily going to give them any priority. We're just going to say these are all problems that you should work on, and come back to us when you're comfortable with whatever the solutions are.

So those are the four options that I've heard today so far. And there may be others, I acknowledge that. But I was just trying to get to the process point of should we, and when I say we I mean these regulatory bodies, try to put some priorities on these, or should we just say, hey, here's four possibilities, go for the ones that you think are best, you know. That's another

possibility.

MR. EUSTIS: Can you repeat three, please?

MR. MESSENGER: Sure. Three is the reference design that governs the communication between equipment onsite like an air conditioner or a dishwasher or a computer or whatever, and some kind of control signal that's coming from the network.

You know, how do we make sure that the network can call for a curtailment when it needs it on an emergency basis, using the same language in San Diego that they use in San Francisco that they use in Sacramento.

So that's what I think of the three, is it's integrating the advanced metering data collection with the call for load curtailment system.

MR. SANZA: I'm Peter Sanza from GE Research. I was also the Project Manager for IntelliGrid. And I just want to make a comment about where you're going with this.

One of the things that we discovered on IntelliGrid was that these things are not necessarily de-couple-able. Now you can set

priorities on which one you want to solve first, but you do need to understand all of them before you start looking for a solution for just one of them.

So, I just -- that subtle nuance there in terms of prioritization. You can give us a directive to solve one of these, but irrespective of that, I think it's prudent to understand all of them. Understand the complete space before we decide how to optimize just one of them.

MR. MESSENGER: Okay. Process check; it's now after 4:00. Can I assume that people want to continue, or would you like me to release everybody except for those people who want to stay?

(Laughter.)

MR. MESSENGER: Think that would make a difference? Go ahead.

MS. CLEVELAND: Okay, Frances Cleveland. I think what I want to do is really agree and emphasize with what Peter said and some of the other people have said. Which is it's all very well and fine and we do need to move ahead rapidly in certain areas. But I think we must have some kind of group that's looking over the whole thing.

And we have a number of presentations today. Of course, IntelliGrid, GridWise, we have the UCA users group, which is sort of the home of OpenAMI. We've got the IEC; standards organizations who are also very active in thinking about these things.

And obviously we have the regulations and the regulators coming through. I really think that we have to establish some kind of over-arching group, maybe one of the ones we've already talked about, but some group that is looking at all of these things and saying, okay, OpenAMI, go do your thing, you know, maybe something on DER or something within the buildings, you know, or these other groups.

And then have some organization there where they come back and talk to each other so that it doesn't get all discombobulated and everybody going off in their own direction.

We've had enough of that. We've seen it an awful lot in the IEC, I'm afraid.

MR. MESSENGER: Okay. Well, I think this is something that we need to think about a little bit more, because I hesitate a little bit forming one of these super oversight groups because they tend to be like a bull in a china

shop. And sometimes they don't realize that they're causing more problems than they're trying to solve.

But nevertheless, it's a reasonable suggestion, and I see two decision nodules that I'll have to consult with the Commissioners on, you know. One is we could just give that charge to AMI, OpenAMI. We could say, look, OpenAMI, make sure you have, you appoint your own oversight group whose only job is to make sure that the different parts of your group are working in some way, so we could turn that over to industry.

Or I've heard other people say, no, you need to have some regulators and maybe some customers on this oversight group.

So if you have some suggestions about what types of people belong in this oversight group, just send them to us and we'll see if that makes sense. I can't figure out right now what's the best way to go.

Sir.

MR. McGRANAGHAN: Mark McGranaghan from EPRI Solutions, working with the IntelliGrid Architecture group.

I just want to also second the comments

of both Frances and Peter, and agree with you that I don't think we need to create another super group. Between the IntelliGrid Architecture and the GridWise Architecture alliance, I think the supergroups are there. And they have the stakeholders involved in the PAGs for the consumer portal project, which is coordinating along with OpenAMI to keep that bigger picture in mind, and the interrelationship between the functional requirements for a lot of different areas.

And I think it would work okay for OpenAMI to work on some of -- focus on some of these short-term objectives, specifically related to the needs in California as Art described.

And by coordinating with GridWise Architecture and the IntelliGrid group, I think we have the oversight to manage that.

MR. MESSENGER: Okay. So I'm going to be presumptive here and suggest that probably a lot of people want to go, so I'm going to try to sum up, and then I'll let someone have their final word, additional comments, okay.

What I've heard the group say so far is there probably is a need for a reference design. And there are some concerns that this reference

design might either derail or de-couple or slow down the PUC process, so we need to make sure that that doesn't happen.

And the other thing that I've heard from the group is that it's important to make sure that there's a representative group of stakeholders who are watching over these processes, and that we actively recruit different stakeholders into the process so that we don't leave people out at the beginning of the process here.

And that, if possible, it might be a good idea for the PUC and the Energy Commission to issue some kind of a ruling or an order that says, you know, here's our ideas to clarify scope and to clarify schedule, you know. Our idea of the scope is X, you know, we want you to deliver on such-and-such schedule. And that will guard against the possibility of the group wandering and not necessarily producing on time.

So, I think, although I don't know, we can certainly recommend to the ALJ that she issues an order within the next two or three weeks that says, you know, I've talked to staff about this workshop that was held and we think the following things should happen. And we can try to clarify

both scope and schedule.

And I think the only other thing that we need to worry about for sure is this worry that Gayatri had of we don't want to have a situation where the reference design causes a major cost increase at the end of the process. You know, where we thought it was going to cost $900 million and now we add the reference design and all of a sudden it's up to $1.3 billion or something. We don't want to have that happen. So we need to make sure that we take steps to make sure that that doesn't happen, if possible.

So that's what I've heard so far.

Go ahead.

MR. DRESSELHUYS: But could I just -- I know people are limited, it's getting to be 4:00. From a housekeeping perspective, can I just repeat where the meeting tomorrow is, just the logistics?

MR. MESSENGER: You can.

MR. DRESSELHUYS: -- OpenAMI. It's at 744 P Street --

COMMISSIONER ROSENFELD: Get up to the mike and do it really officially. I'm egging you on.

MR. DRESSELHUYS: Yes, egg me on. The

meeting tomorrow is at 744 P Street, Building 9, in the auditorium. So if you can come tomorrow, that's great. It starts at 9:00 a.m., 9:00 a.m.

For those who can't come, and I apologize because this has come together quite quickly, please visit OpenAMI.org, which is the site. If it's not up, it'll be up in the next couple of days, a collaboration site.

A question was asked, and I think fairly, about is this a black box that at the end of six months something just emerges. And the site is being set up so that you can see iteratively and comment remotely. So if you cannot come to the meeting, it's, you know, logistics are hard. As people post work for review anybody that joins up -- and it's free, and you just join up and get password -- you can post your comments and they'll be tracked, as well.

So, the folks involved are very conscious that everybody's got day jobs on top of this. And you got to do your work. But you want to be involved in this. And so there's not a requirement that you have to physically come to be a participant or to contribute content.

And so I just would encourage everybody

to do those things.

COMMISSIONER ROSENFELD: Remind us who you are.

UNIDENTIFIED SPEAKER: Eric, is there an agenda for tomorrow's meeting?

COMMISSIONER ROSENFELD: Remind us who you are.

MR. DRESSELHUYS: Oh, I'm sorry. I'm Eric Dresselhuys from SilverSpring Networks.

MR. BELL: And I would just add one more comment to Eric's, which is when the group got together and talked about the draft schedule it was a strawman schedule. And given all the feedback today, I think tomorrow's meeting we should, you know, as a team, re-look at that schedule. And also schedule another in-person meeting quickly so that gives plenty of people notice and time to get it on their calendars.

MR. DRESSELHUYS: Yeah, but the one agenda item, Dick, that was listed for tomorrow's agenda was this issue that's been hashed here quite heavily, which is the scoping question. And that was really the goal for tomorrow was to try to define some scope and kind of logistical calendar issues.

And I think for all the reasons that have come out here, that's been important.

And I would just, while I'm up I would just emphasize that I think that the Commission here for California putting forth requirements is a part of it. Because, just I'm curious that we haven't talked a lot about Ontario here, but it's an interesting parallel thing that's going on where they've kind of leap-frogged and come in and been very dictatorial from a commission standpoint on some very specific things, without any input other than a few write a letter.

So, if you haven't seen that, check OED, as well.

MR. MESSENGER: Okay. So I'm going to wrap up this meeting by just mentioning two things. You want to say something first? Go ahead.

MR. SCHOETTLE: I wanted to add just a couple comments. My name is Roland Schoettle; I'm with Optimal Technologies.

As we go through this process I'm trying to understand at the end of the day how we defend this. And it's interesting, everybody I think in the room would probably agree that the current

meters you see on the back of your house are a standard.

Yet if you go to any of the utilities they individually have to get them authorized and, you know, go through a process. So you'll find that if you go to one utility and then go to another utility, they will not allow the same meter in all these various utilities.

What happens when we go through this process here and we sit down and we build this reference design, which I think is a great idea, how do we make certain that, you know, is there a process where a body gets put in place that says if you meet this spec every utility by default can use this and not have to go through the process of having to get authorized again at the utility level? Because they can easily shut this down.

So if you take that perspective and, you know, the meters are, let's say, $50, and the meter list is a short list, if you're a new vendor trying to come in to make it onto that short list, and you have a new innovative approach to this which might be cheaper, you might go broke before you actually go through the approval process. This, I think, is a fundamental issue that we need

to resolve.

Secondly, looking at costs, if you're really concerned about costs, in the transmission business, you know, I was at the meeting last Friday with the League of Women Voters, as well, in San Francisco, and Jim Detmers got up, which is the operations guy for the California ISO, and he says it's all location-based. Location, location, location. All of his problems are based on location.

The same thing applies to understanding how to make the most of the load management. So if you're doing a demand response program, and you're trying to get the most value up front, you should only focus on the locations where it actually makes most sense to do so. That gives you also more time to roll it out over a year or two or three, to the rest of the contingency that doesn't actually need it, but has to be put in place for regulatory -- you know, for sort of common access purposes.

So that's really my two cents. Thank you.

MR. MESSENGER: Thank you. And I'm not going to get involved in a long discussion because

it's 4:15. So we're not going to go there right now.

I just want to do two things so people can know what, if you're still interested and motivated after spending this long day, there's two ways that you can get involved.

One, you can participate in OpenAMI.org and I'm sure that they will help you do whatever you want in terms of participating.

Secondly, if you can't or you don't want to for some reason participate in OpenAMI, but you still have feelings or comments, you can send them to either Laurie or myself here at the Commission and we'll make sure that they get to the decisionmakers. So you can opt to stay out of the AMI process if you want to, just communicate directly with us.

And we will try to make sure that there is some form of communication between the OpenAMI group and the regulators so that they don't pursue different agendas or go down different paths.

And we'll work out with them whether that needs to be, you know, once a month or once a quarter or once a week, I don't know.

Okay, are there any other things that

people want to say? Laurie.

MS. TEN HOPE: I do have an announcement. Several people have asked about the presentations. So presentations from today are on our website. It's kind of a long website, but it's energy.ca.gov/pier/notices/ then today's date. And you'll be able to pick up the presentations.

We also, this is also being transcribed and we'll post that, as well, so that if you want a transcription of today's workshop, that's available as well.

MR. MESSENGER: Except for mine, which you're going to have to buy, so --

(Laughter.)

MR. MESSENGER: It's not available.

(Laughter.)

COMMISSIONER ROSENFELD: Would you just repeat it once more? I'm sorry.

MS. TEN HOPE: energy.ca.gov/ -- backsplash -- backslash -- backsplash --

(Laughter.)

MS. TEN HOPE: -- p-i-e-r --

COMMISSIONER ROSENFELD: Actually it's not a backslash, it's a slash.

MR. MESSENGER: Okay.

COMMISSIONER ROSENFELD: Go ahead.

MS. TEN HOPE: -- slash notices/2005-02-01 workshop -- you'll get there by links. So basically if you go to the PIER website it'll direct you off of that website to the notices and the presentations.

MR. MESSENGER: So I guess the last thing to do -- are you --

MS. TEN HOPE: Probably the same thing you're going to do is to --

MR. MESSENGER: Go ahead.

MS. TEN HOPE: -- thank everybody for coming, for spending the day here. It was a great turnout. A lot of productive comments. And hopefully the beginning of an ongoing dialogue about what's needed to really develop this infrastructure.

So, thank you very much.

MR. PRESTON: Mike, one question. What is the followup actions to this meeting?

MR. MESSENGER: The followup actions to this meeting are number one, the regulatory people will issue some kind of response about how they want to use this relationship with OpenAMI or not.

And two, anyone here who's interested in getting involved in OpenAMI.org should.

Those are the only ones that I know of right now. If there are others that you think we should pursue, let us know.

(Whereupon, at 4:17 p.m., the workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 22nd day of February, 2005.